

BTI Wireless

ENGINEERING TEST REPORT FOR

**800MHz 40W Remote Transmitting Unit
Model: mBSC0800-040-RUC11**

Tested To The Following Standards:

FCC Part 22H

Report No.: 94690-7

Date of issue: August 19, 2013

We strive to create long-term, trust based relationships by providing sound, adaptive, customer first testing services. We embrace each of our customers' unique EMC challenges, not as an interruption to set processes, but rather as the reason we are in business.

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

BTI Wireless
6185 Phyllis Drive Unit D
Cypress, CA 90630

Representative: Winston Abrian

REPORT PREPARED BY:

Dianne Dudley
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 94690

DATE OF EQUIPMENT RECEIPT:

July 22, 2013

DATE(S) OF TESTING:

July 22-29, 2013

Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the sample equipment tested in the agreed upon operational mode(s) and configuration(s) as identified herein. Compliance assessment remains the client's responsibility. This report may not be used to claim product endorsement by A2LA or any government agencies. This test report has been authorized for release under quality control from CKC Laboratories, Inc.



Steve Behm
Director of Quality Assurance & Engineering Services
CKC Laboratories, Inc.

Test Facility Information



Our laboratories are configured to effectively test a wide variety of product types. CKC utilizes first class test equipment, anechoic chambers, data acquisition and information services to create accurate, repeatable and affordable test results.

TEST LOCATION(S):
CKC Laboratories, Inc.
110 Olinda Place
Brea, CA 92823

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.00.14
Immunity	5.00.07

Site Registration & Accreditation Information

Location	CB #	TAIWAN	CANADA	FCC	JAPAN
Brea A	US0060	SL2-IN-E-1146R	3082D-1	90473	A-0147

SUMMARY OF RESULTS

Standard / Specification: FCC Part 22H

Description	Test Procedure/Method	Results
RF Power Output	2.1046/22.913(a)	Pass
Occupied Bandwidth	FCC Part 22H / FCC Part 2.1049(I)	Pass
Spurious Emissions at Antenna Terminal	2.1051 / 22.917(a)	Pass
Field Strength of Spurious Radiation	2.1053 / 22.917(a)	Pass
Bandedge	FCC Part 22H	Pass
Intermodulation	FCC Part 22H	Pass
Out of Band Rejection	FCC Part 22H	Pass

Conditions During Testing

This list is a summary of the conditions noted for or modifications made to the equipment during testing.

Summary of Conditions
None

EQUIPMENT UNDER TEST (EUT)

EQUIPMENT UNDER TEST

800MHz 40W Remote Transmitting Unit

Manuf: BTI Wireless

Model: mBSC0800-040-RUSSF02

Serial: 08001310001

PERIPHERAL DEVICES

The EUT was tested with the following peripheral device(s):

ESG Vector Signal Generator

Manuf: Agilent

Model: 4438C

Serial: MY45092055

ESG Vector Signal Generator

Manuf: Agilent

Model: 4433B

Serial: US40052164 / US40031692

Power Sensor

Manuf: Agilent

Model: E4412A

Serial: MY41502826

Power Meter

Manuf: HP

Model: EPM-441A

Serial: UGB37170458

FCC PART 22H

This report contains EMC emissions test results under United States Federal Communications Commission (FCC) requirements for licensed devices.

2.1046 / 22.913(a) - RF Power Output

Test Conditions / Setup

Test Location: CKC Laboratories, Inc. • 110 North Olinda Place • Brea, CA 92823 • 714-993-6112

Customer: **BTI Wireless**

Specification: **22.913(a) RF Output Power**

Work Order #: **94690** Date: 7/24/2013

Test Type: **Conducted Emissions** Time: 14:18:15

Equipment: **800MHz 40W remote transmitting unit** Sequence#: 1

Manufacturer: BTI Wireless Tested By: E. Wong

Model: mBSC0800-040-RUC11 110V 60Hz

S/N: 08001310001

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	2/6/2013	2/6/2015
T2	ANP06153	Cable	16301	10/27/2011	10/27/2013

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
800MHz 40W remote transmitting unit*	BTI Wireless	mBSC0800-040-RUC11	08001310001

Support Devices:

Function	Manufacturer	Model #	S/N
ESG Vector Signal Generator	Agilent	4433B	US40052164

Test Conditions / Notes:

The EUT is placed on the test bench. Tx In is connected to an ESG Signal generator, ANT is connected to a spectrum analyzer and attenuator. RX out port is terminated to 50 ohm load. The evaluation is performed at the antenna port using Channel power function of the spectrum analyzer.

Freq: 869-894MHz

Signal protocol: LTE-TM1.1 1.4MHz, 5MHz, 20MHz

The RF output power was measured automatic level control threshold setting (ALCTH) as listed in the result table for RF Output power of 40W, 20W, 10W

21°C, 47% Relative Humidity.

The EUT is a RF amplifier operating the 869-894MHz band under part 22. The manufacture does not provide an antenna for sale with the product; hence EIRP is not measured nor calculated. The Automatic Level Control Threshold of each individual unit is to be programed to produce conducted RF output power as rated at the time of deployment.

The end user of this product is to exercise proper engineering judgment to select the appropriate antenna to comply with the EIRP limitation set forth

22.913 (a) Maximum ERP. The effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 Watts. The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

40W

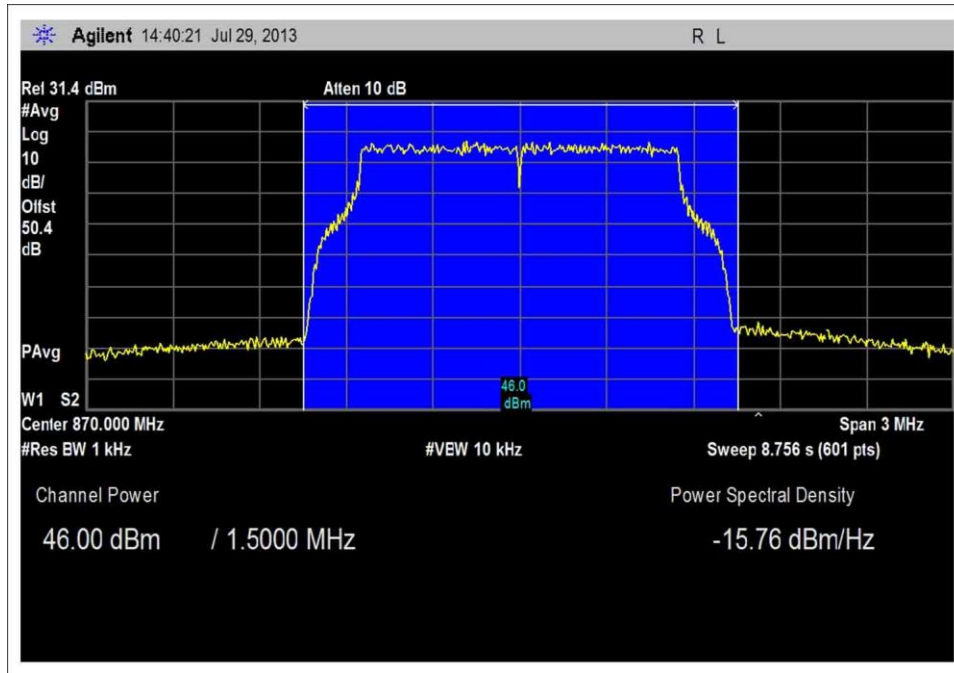
Modulation	ALCTH	Power (dBm)	Power (W)
LTE 1.4MHz			
870MHz	1824	46.00	39.81
881.5MHz	1824	46.04	40.18
893MHz	1824	45.50	35.48
LTE 5MHz			
871.75MHz	1680	45.97	39.54
881.5MHz	1680	46.01	39.90
891.25MHz	1680	45.79	37.93
LTE 20MHz			
879.75MHz	1616	46.01	39.90
881.5MHz	1616	45.99	39.72
883.25MHz	1616	45.93	39.17

20W

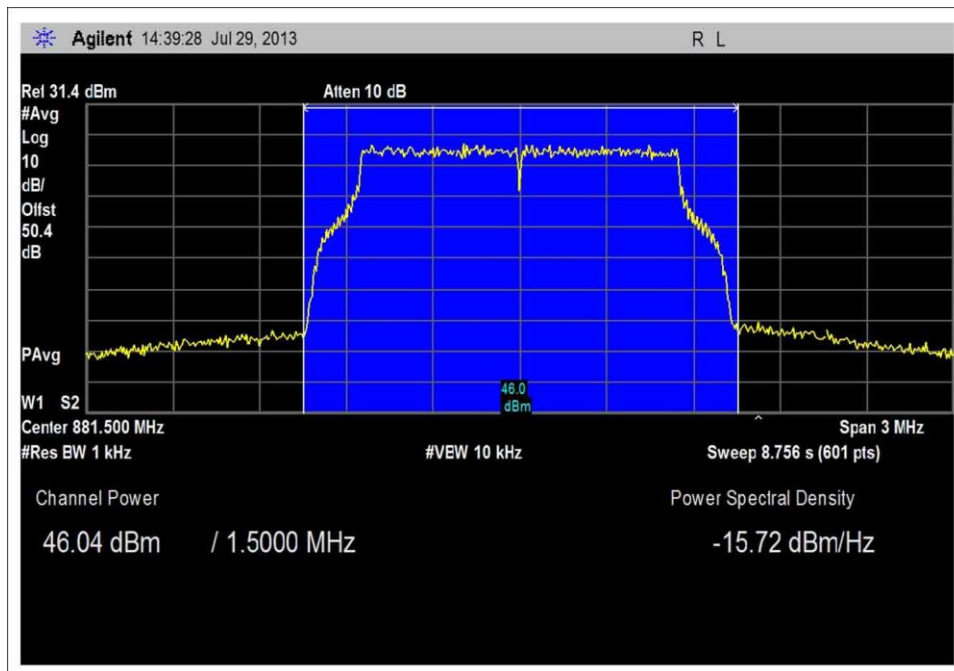
Modulation	ALCTH	Power (dBm)	Power (W)
LTE 1.4MHz			
870MHz	1288	42.88	19.41
881.5MHz	1288	42.99	19.91
893MHz	1288	42.68	18.54
LTE 5MHz			
871.75MHz	1176	42.97	19.82
881.5MHz	1176	43.00	19.95
891.25MHz	1176	42.83	19.19
LTE 20MHz			
879.75MHz	1144	42.99	19.91
881.5MHz	1144	43.01	20.00
883.25MHz	1144	43.02	20.04

10W

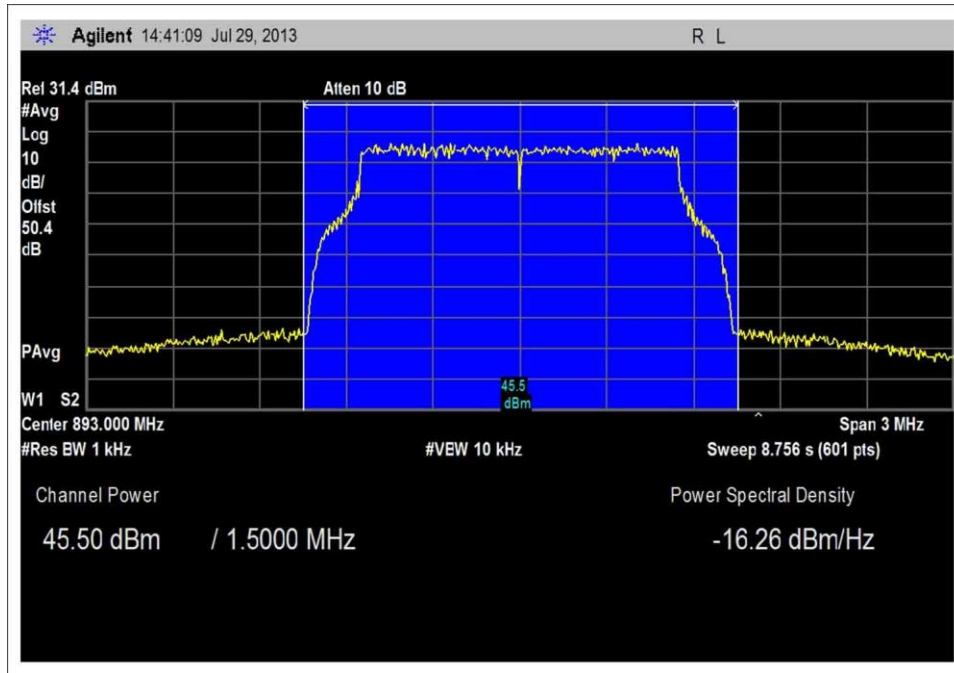
Modulation	ALCTH	Power (dBm)	Power (W)
LTE 1.4MHz			
870MHz	872	39.98	9.95
881.5MHz	872	40.04	10.09
893MHz	872	39.77	9.48
LTE 5MHz			
871.75MHz	816	40.03	10.07
881.5MHz	816	39.97	9.93
891.25MHz	816	39.76	9.46
LTE 20MHz			
879.75MHz	792	39.99	9.98
881.5MHz	792	39.97	9.93
883.25MHz	792	39.95	9.89



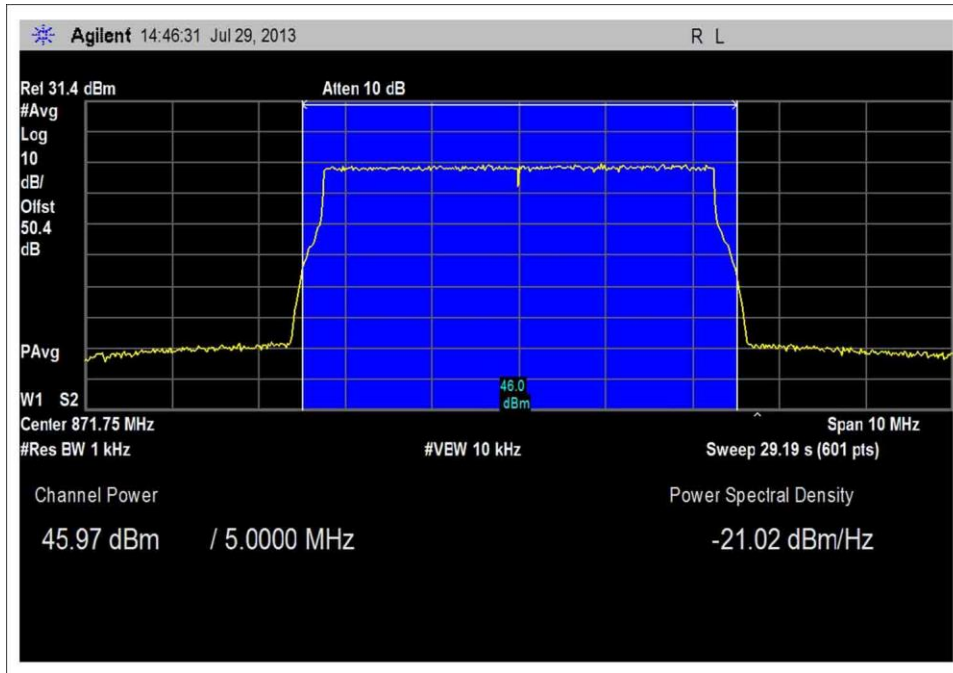
LTE 1.4MHz, Low Channel 40W



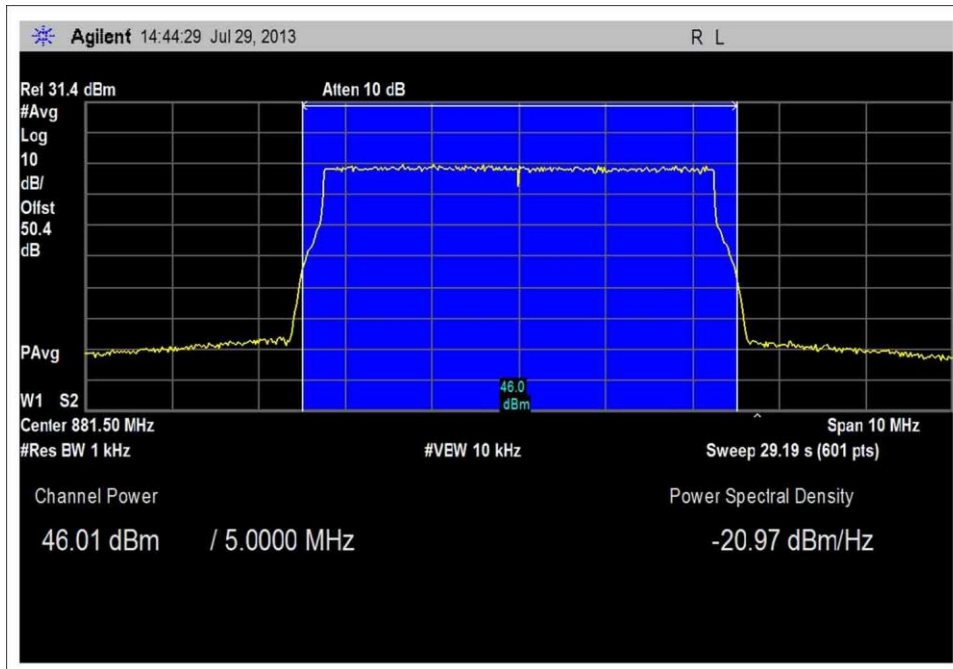
LTE 1.4MHz, Middle Channel 40W



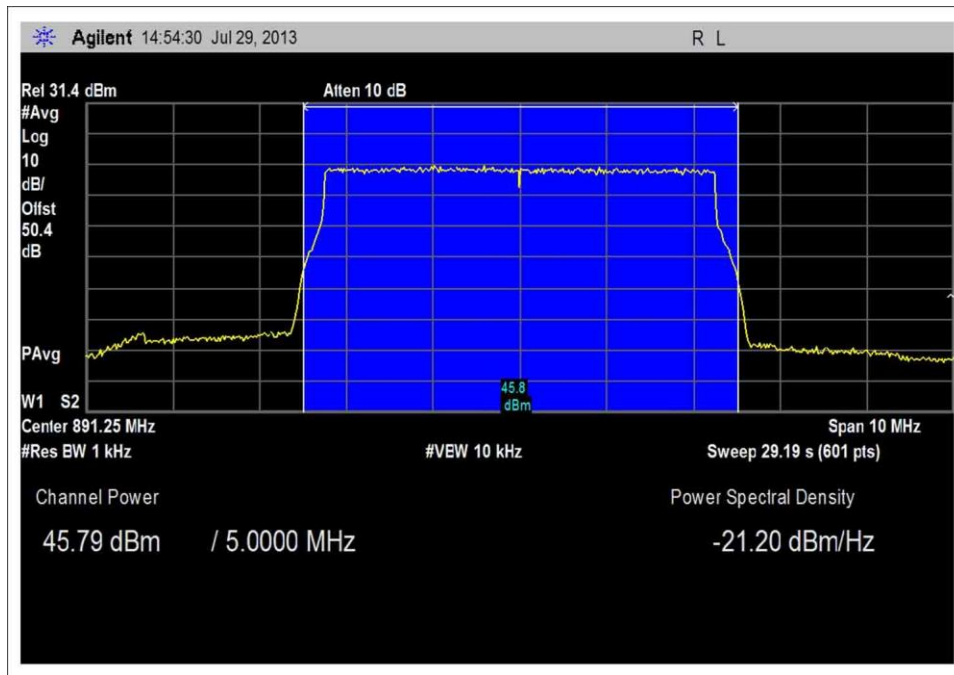
LTE 1.4MHz, High Channel 40W



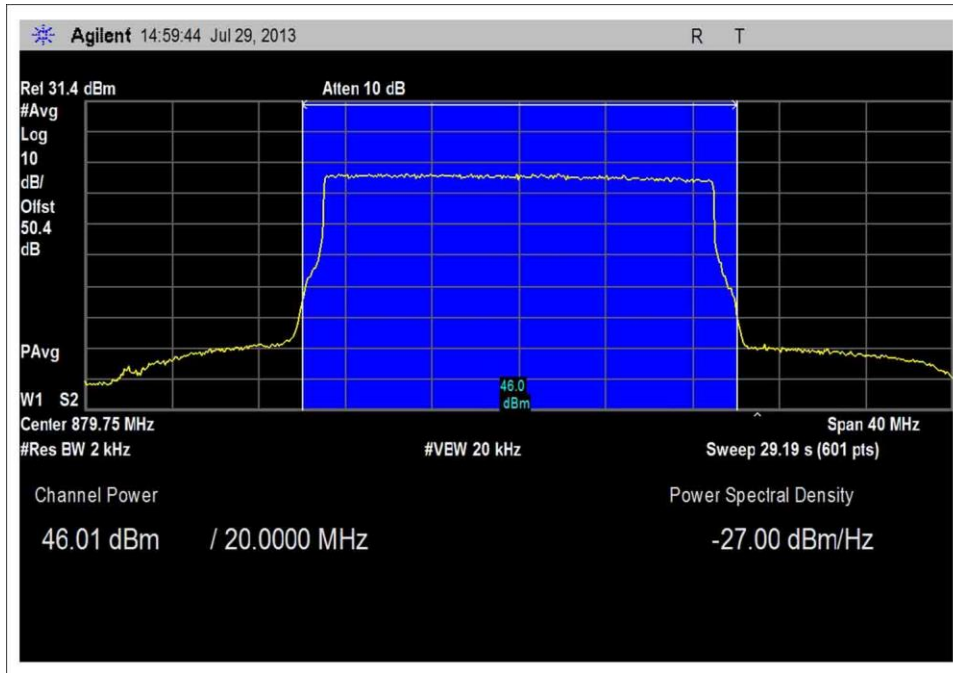
LTE 5MHz, Low Channel 40W



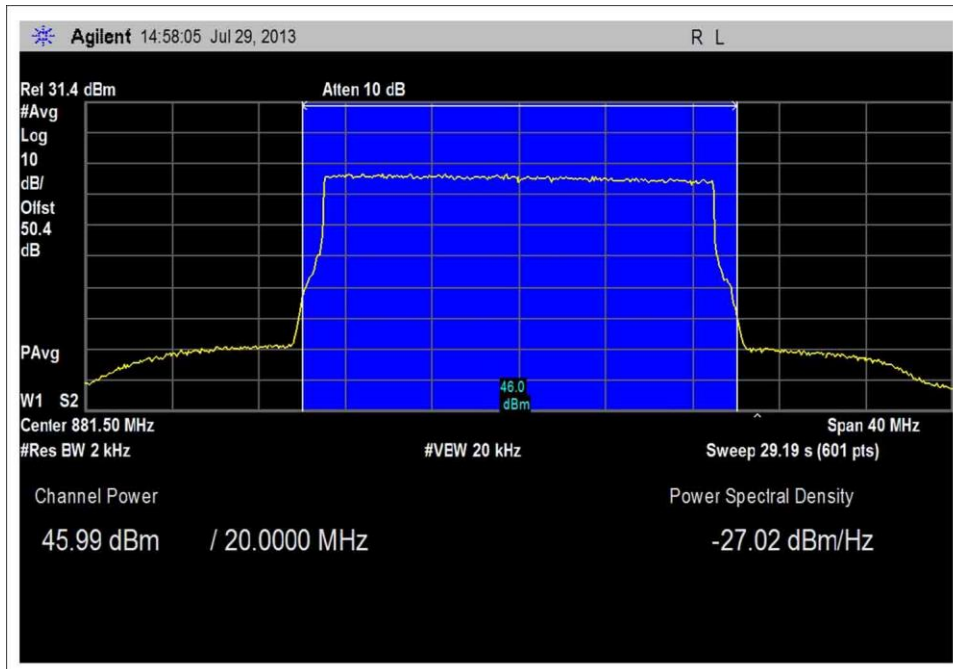
LTE 5MHz, Middle Channel 40W



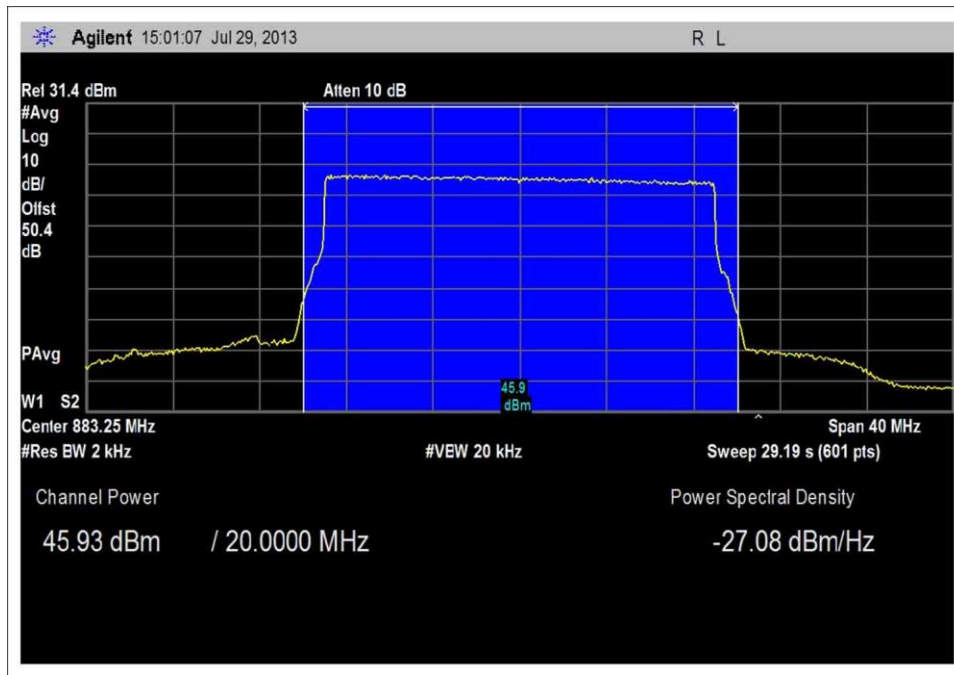
LTE 5MHz, High Channel 40W



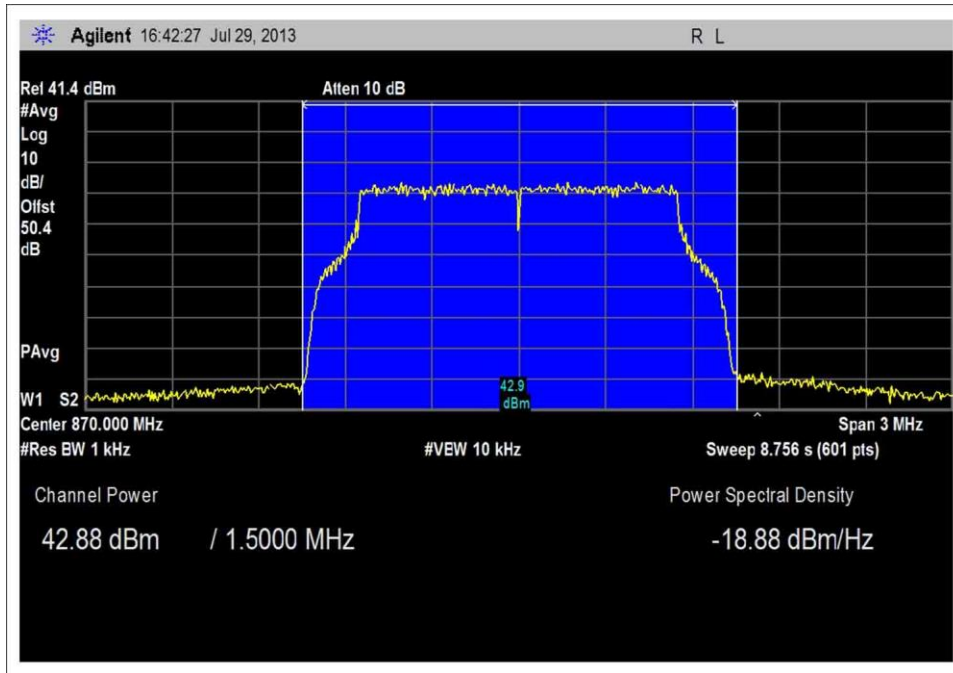
LTE 20MHz, Low Channel 40W



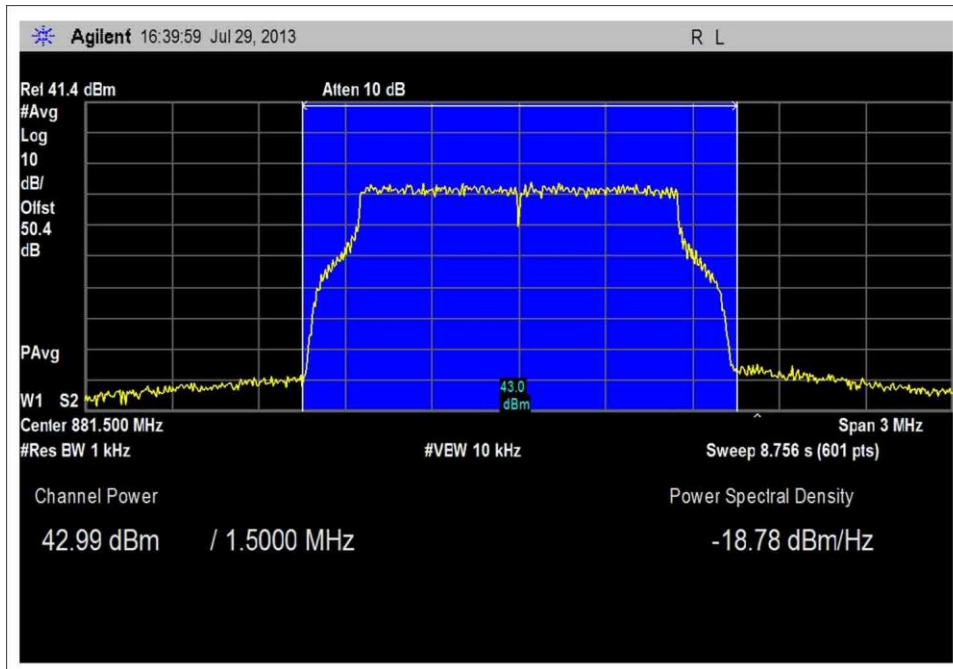
LTE 20MHz, Middle Channel 40W



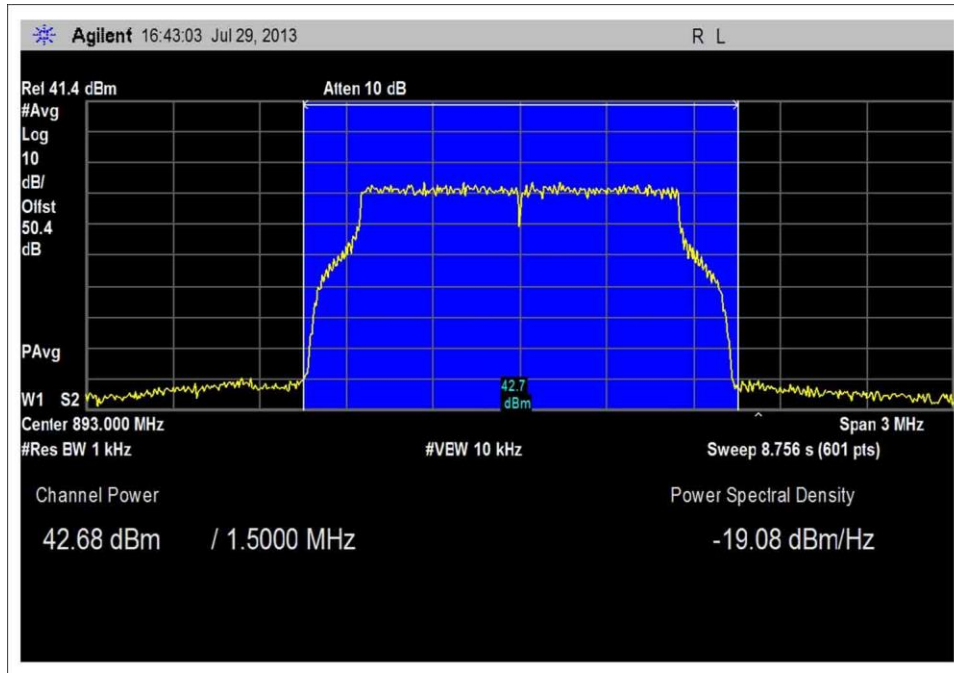
LTE 20MHz, High Channel 40W



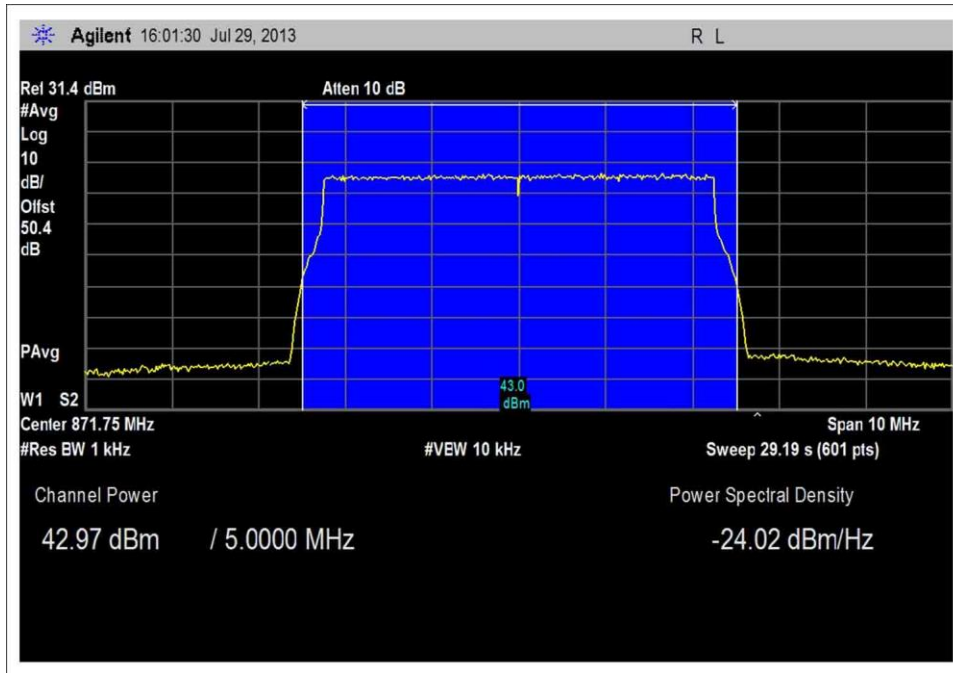
LTE 1.4MHz, Low Channel 20W



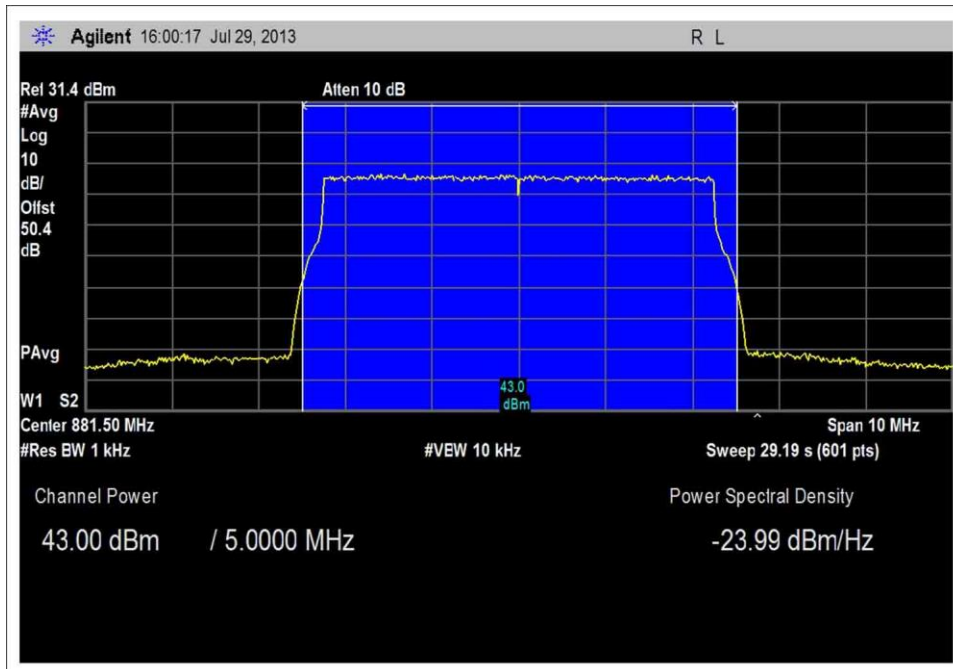
LTE 1.4MHz, Middle Channel 20W



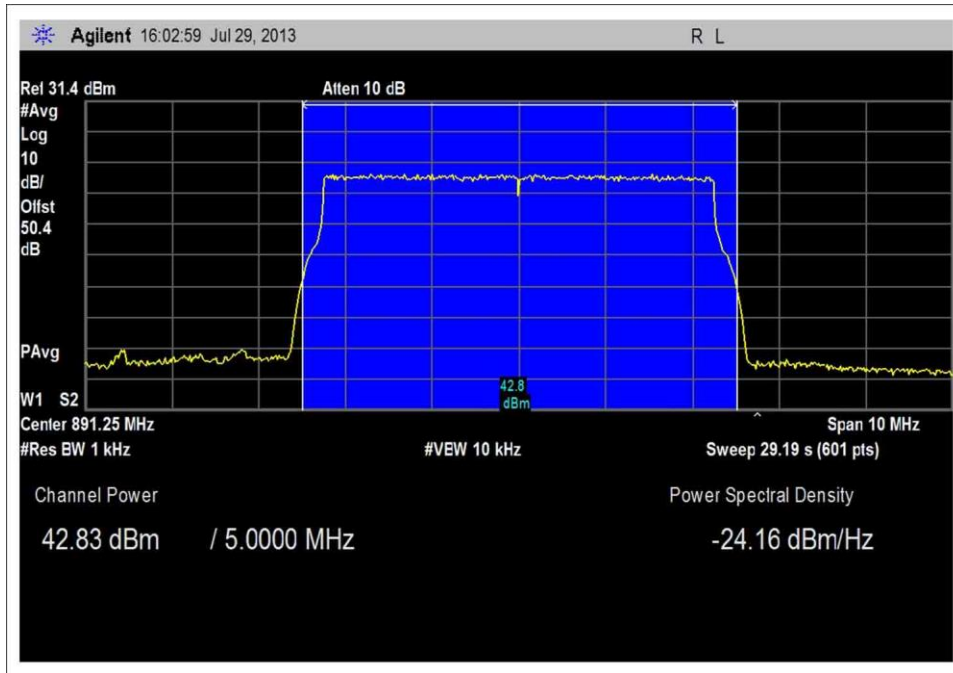
LTE 1.4MHz, High Channel 20W



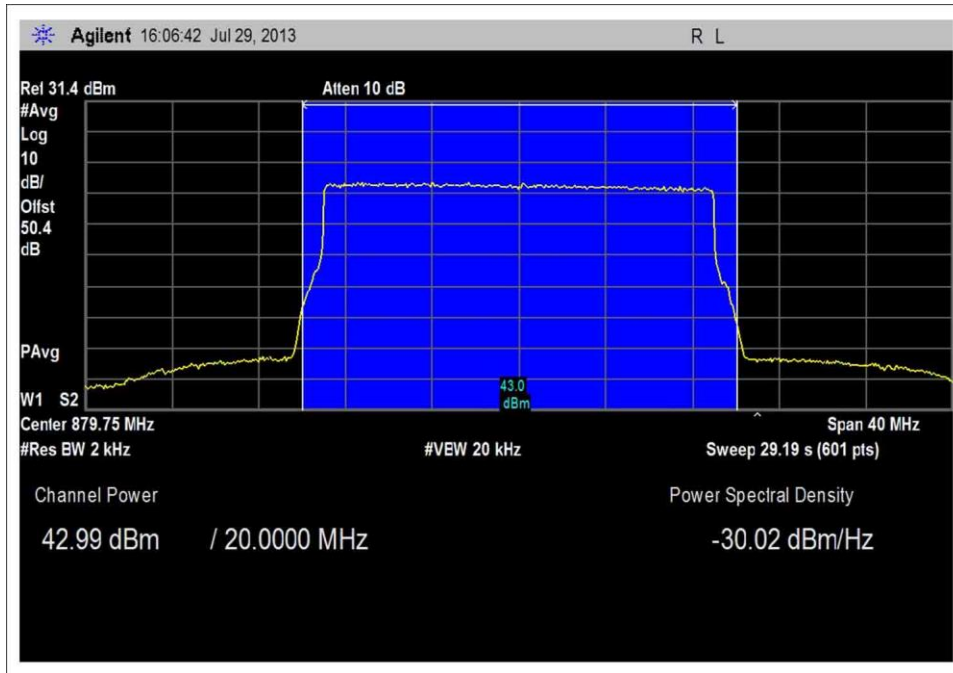
LTE 5MHz, Low Channel 20W



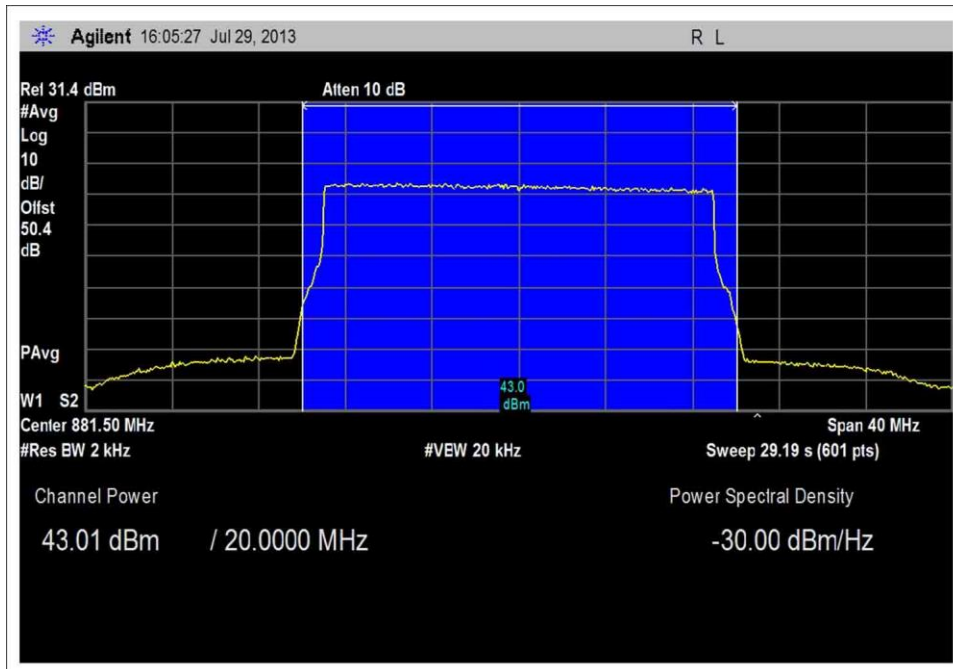
LTE 5MHz, Middle Channel 20W



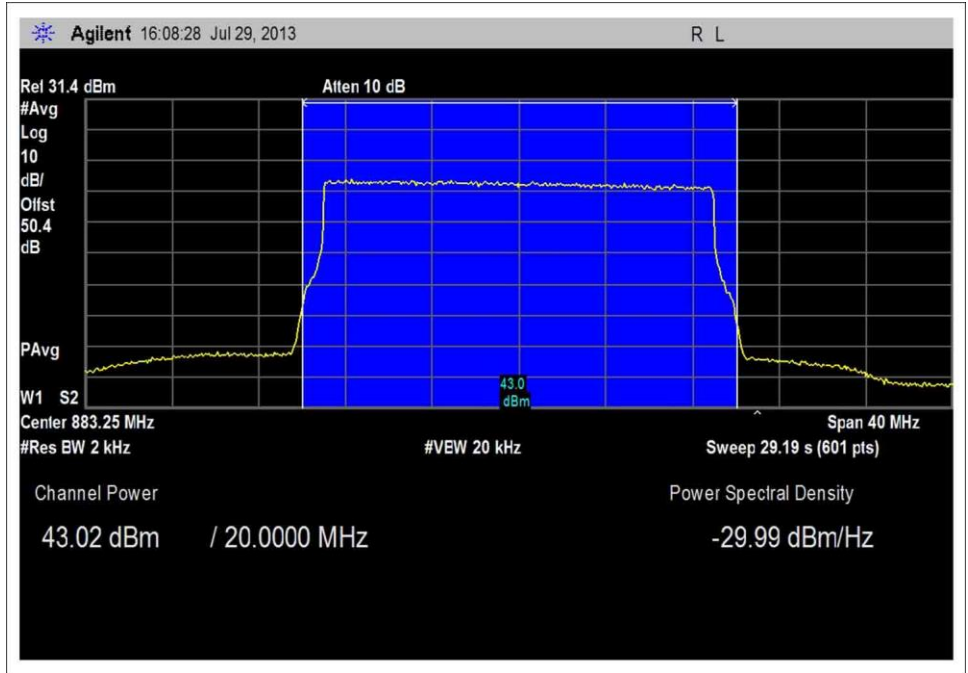
LTE 5MHz, High Channel 20W



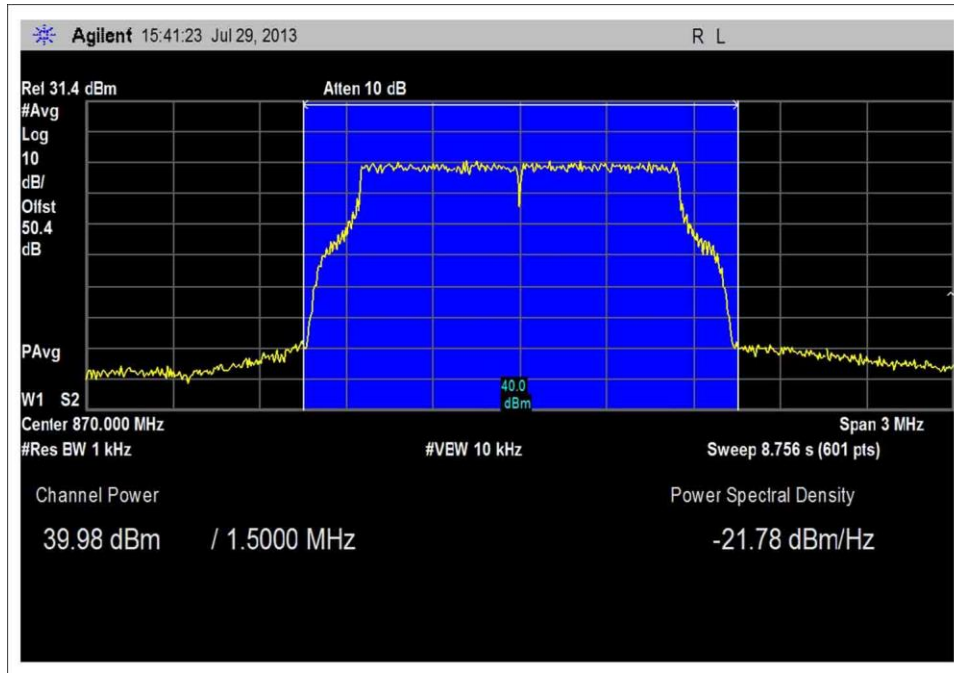
LTE 20MHz, Low Channel 20W



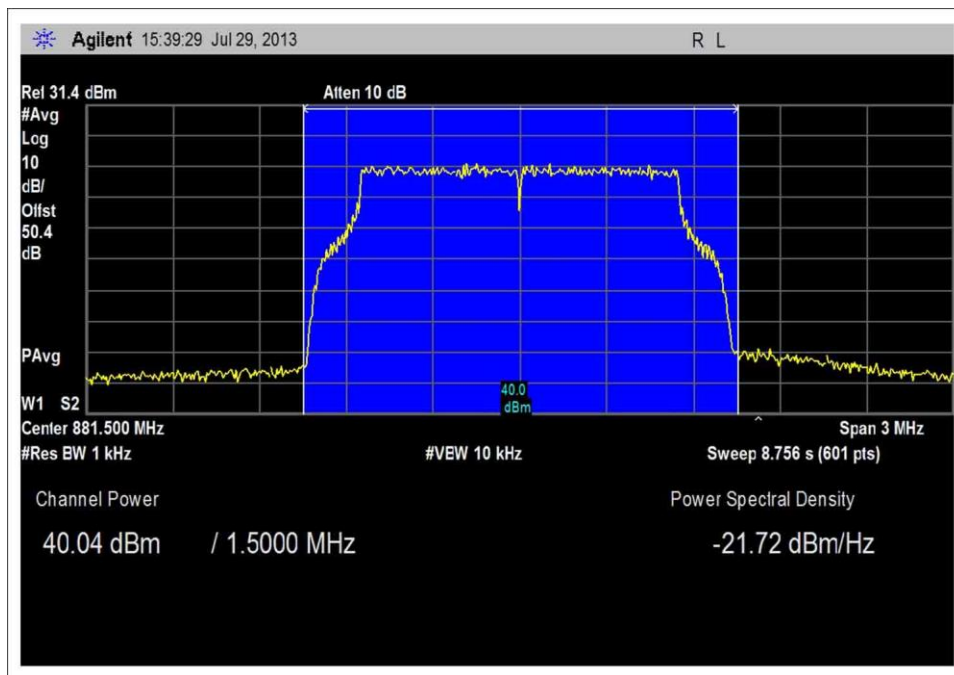
LTE 20MHz, Middle Channel 20W



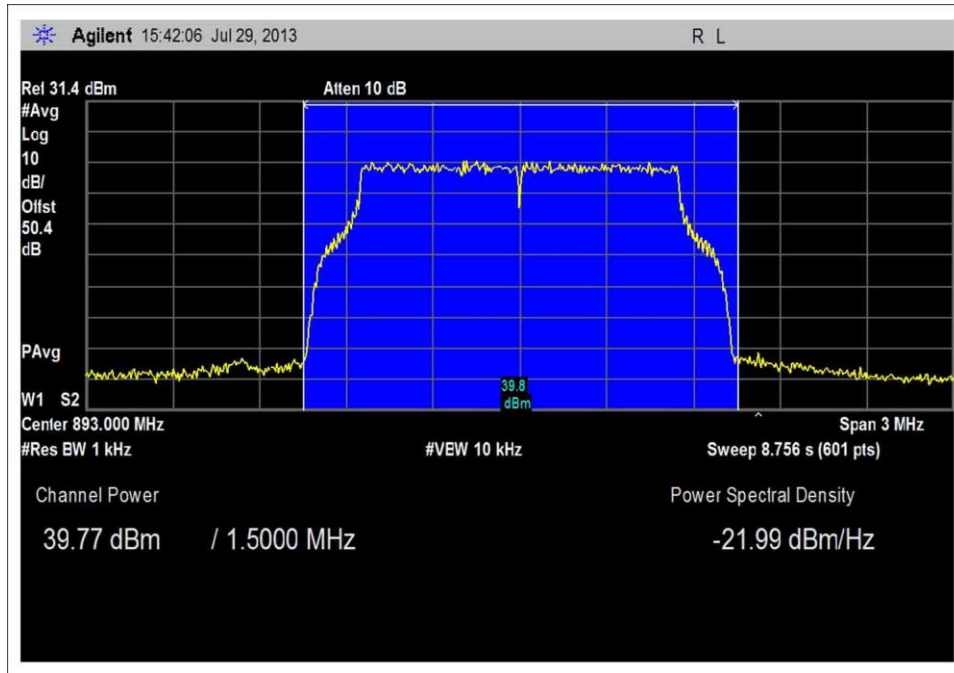
LTE 20MHz, High Channel 20W



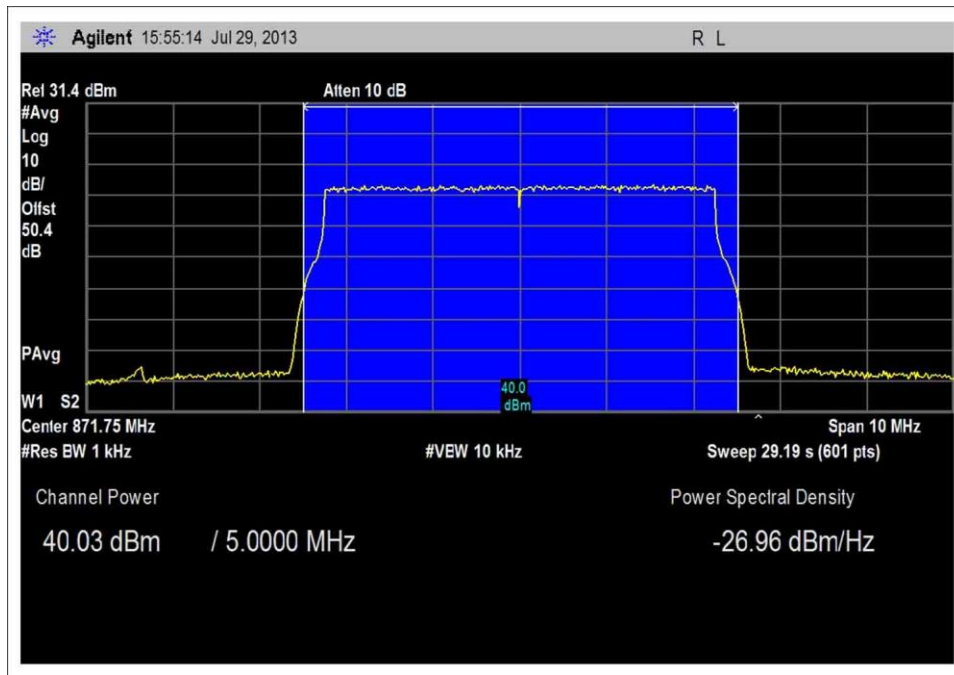
LTE 1.4MHz, Low Channel 10W



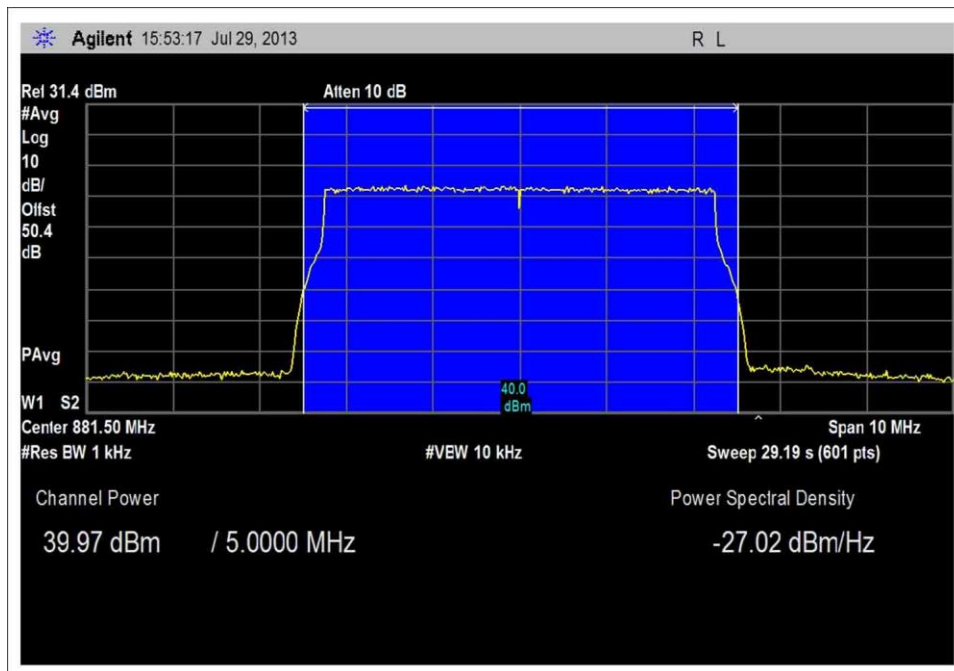
LTE 1.4MHz, Middle Channel 10W



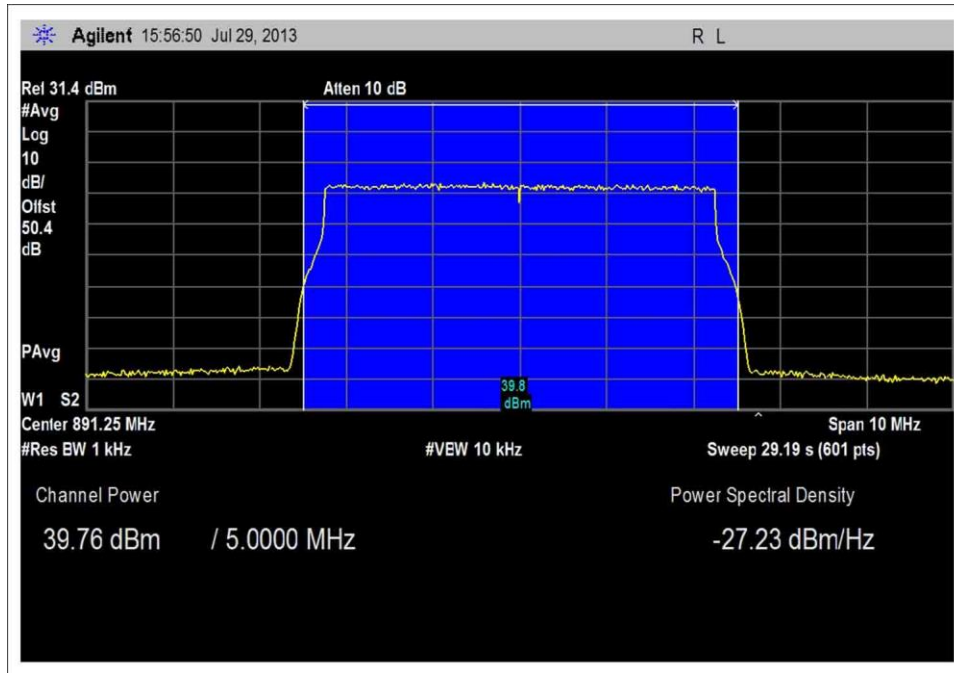
LTE 1.4MHz, High Channel 10W



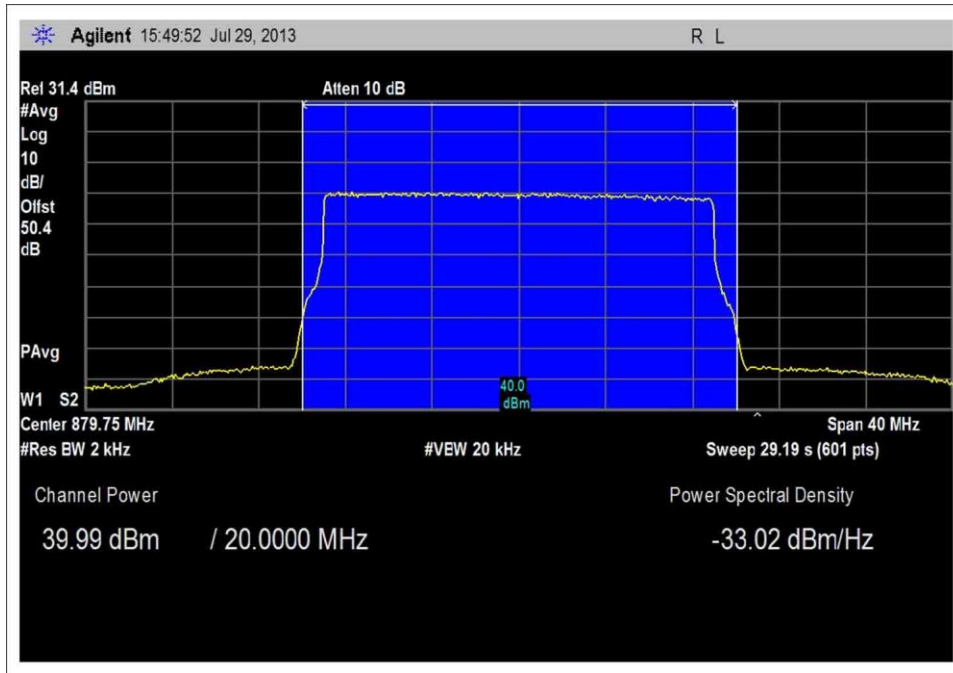
LTE 5MHz, Low Channel 10W



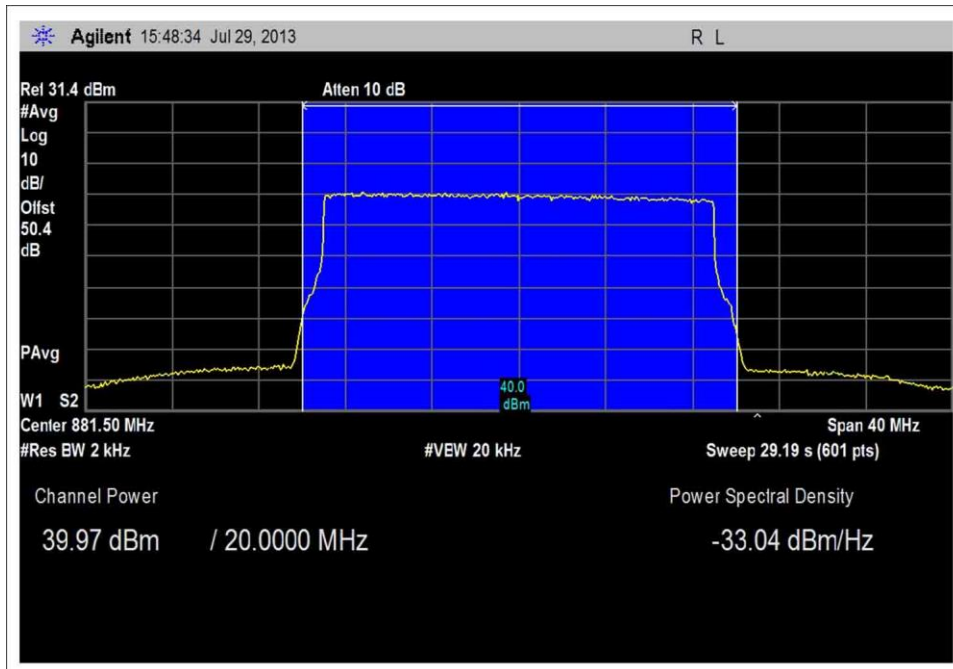
LTE 5MHz, Middle Channel 10W



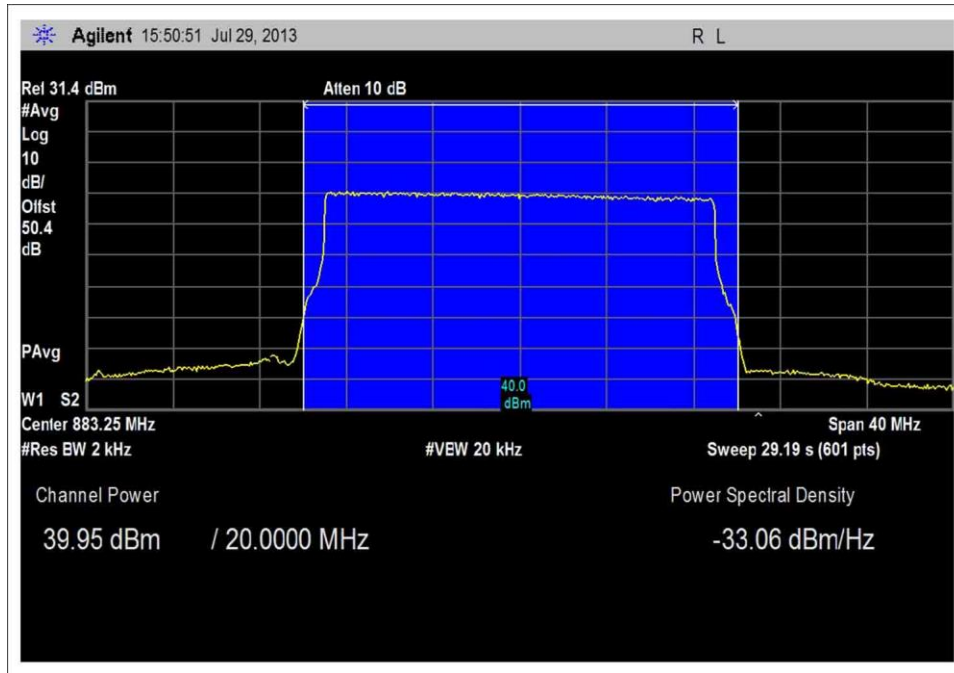
LTE 5MHz, High Channel 10W



LTE 20MHz, Low Channel 10W



LTE 20MHz, Middle Channel 10W



LTE 20MHz, High Channel 10W

Test Setup Photos



2.1049(I) Bandwidth Limitations

Test Conditions / Setup

Test Location: CKC Laboratories, Inc. • 110 North Olinda Place • Brea, CA 92823 • 714-993-6112

Customer: **BTI Wireless**

Specification: **Occupied Bandwidth Input vs Output plot**

Work Order #: **94690** Date: 7/24/2013

Test Type: **Conducted Emissions** Time: 14:18:15

Equipment: **800MHz 40W remote transmitting unit** Sequence#: 1

Manufacturer: BTI Wireless Tested By: E. Wong

Model: mBSC0800-040-RUC11 110V 60Hz

S/N: 08001310001

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	2/6/2013	2/6/2015
T2	ANP06153	Cable	16301	10/27/2011	10/27/2013

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
800MHz 40W remote transmitting unit*	BTI Wireless	mBSC0800-040-RUC11	08001310001

Support Devices:

Function	Manufacturer	Model #	S/N
ESG Vector Signal Generator	Agilent	4433B	US40052164

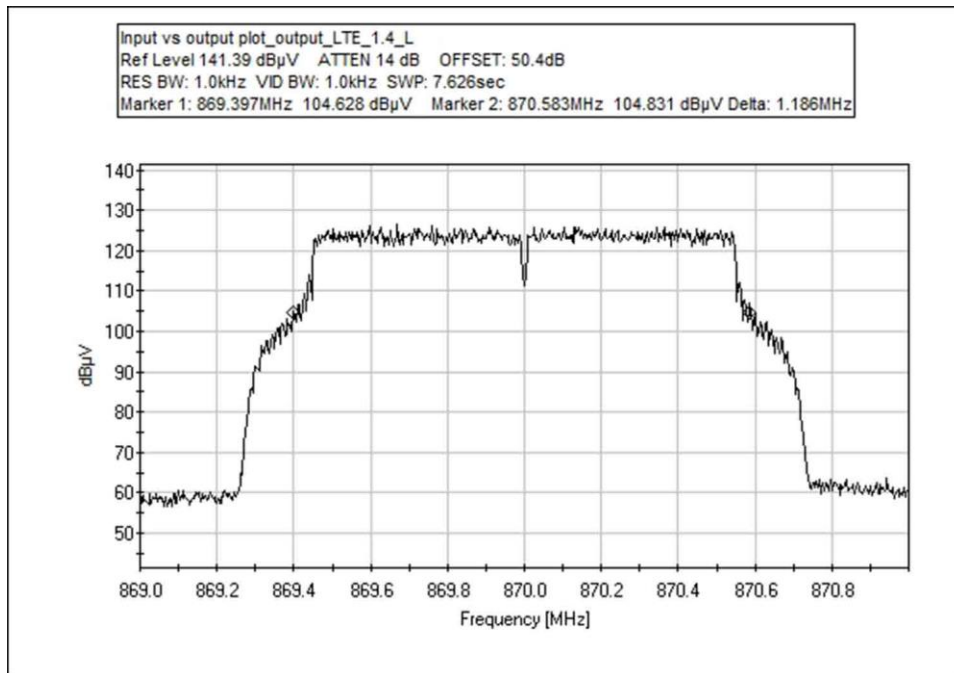
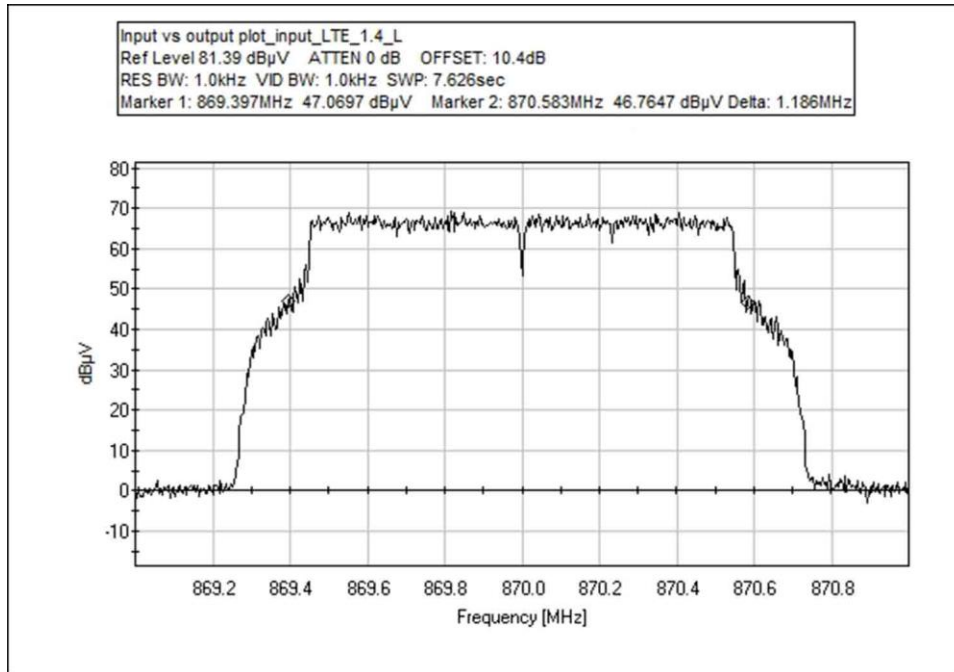
Test Conditions / Notes:

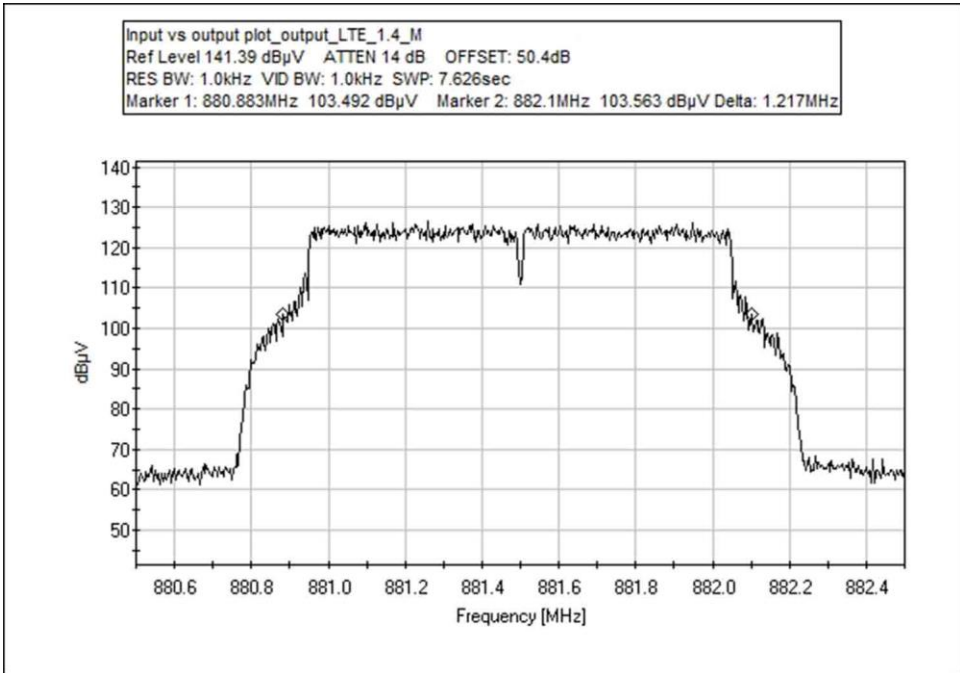
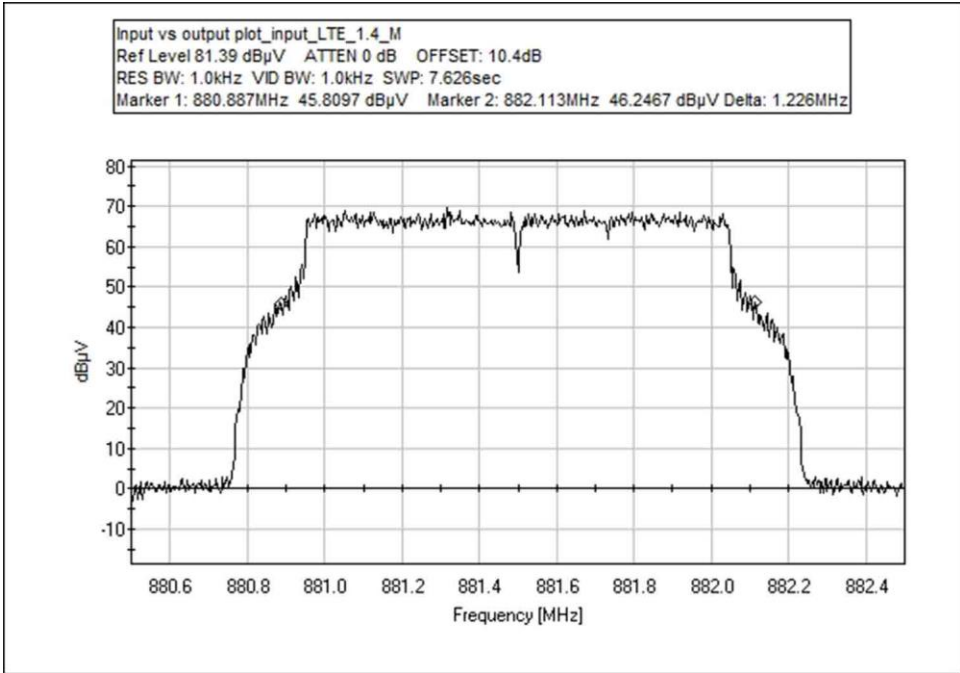
The EUT is placed on the test bench. Tx In is connected to an ESG Signal generator, ANT is connected to a spectrum analyzer and attenuator. RX out port is terminated to 50 ohm load.

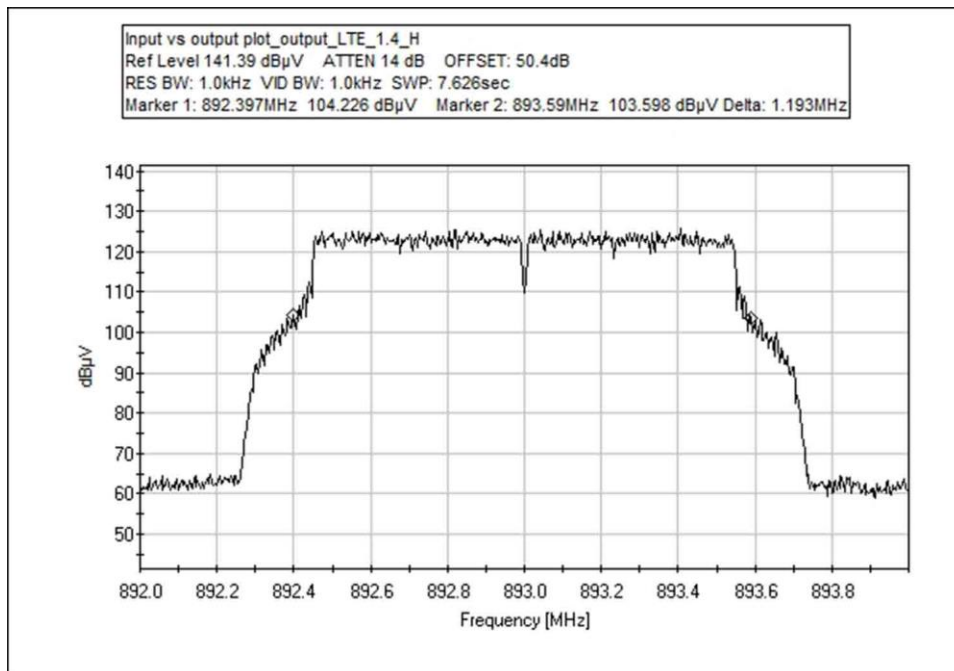
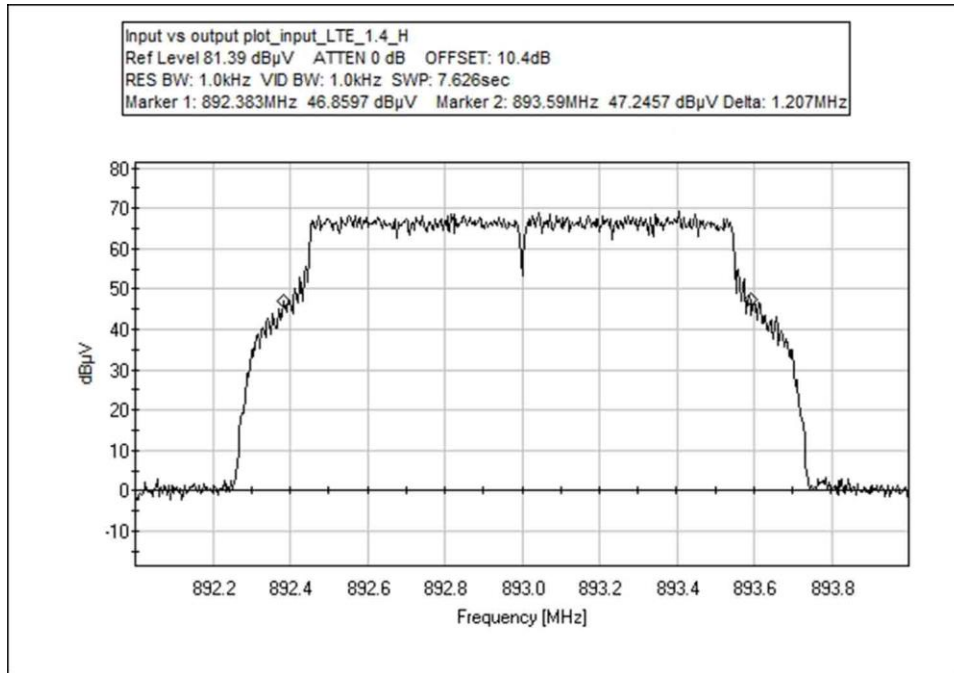
Output waveform is recorded with a spectrum analyzer at the Antenna port of the device.
 Input waveform is recorded with a spectrum analyzer at the RF out of the support ESG.

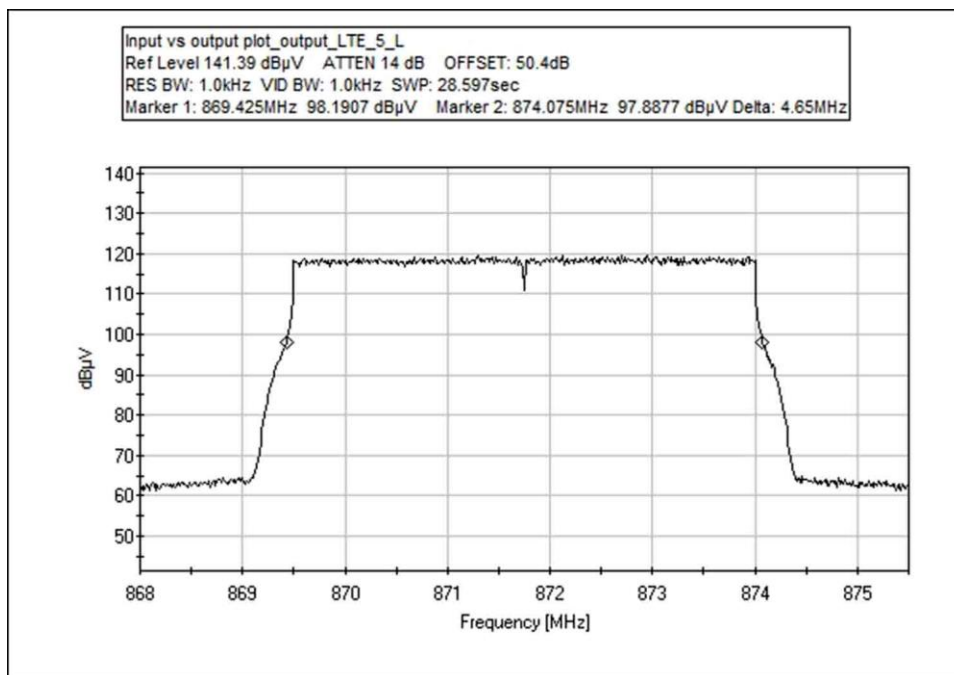
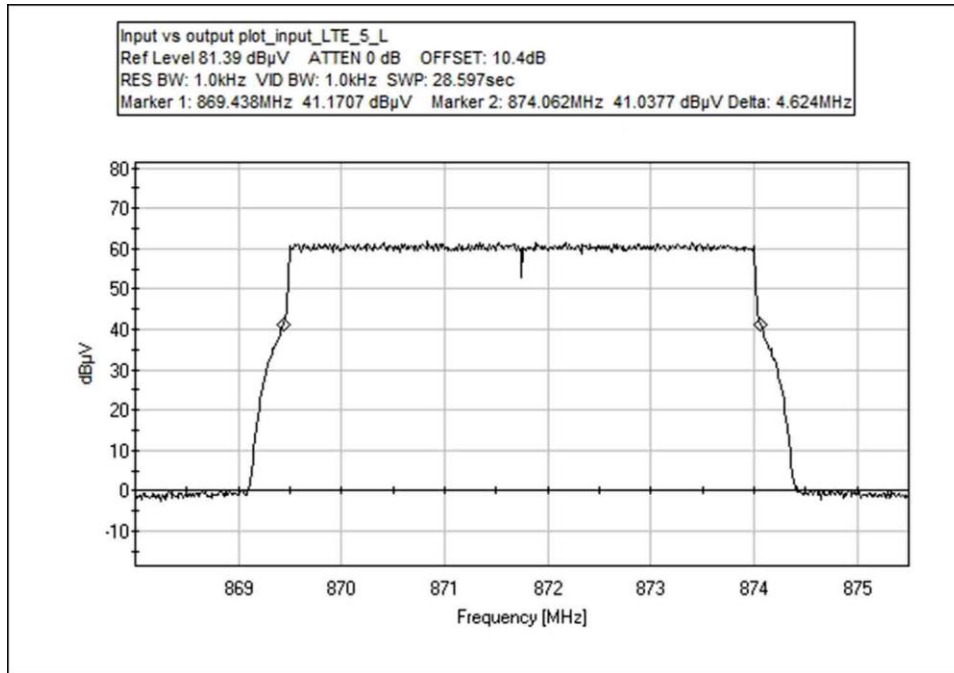
Freq: 869-894MHz
 Signal protocol: LTE-TM1.1 1.4MHz, 5MHz. 20MHz
 Power: 40 W
 21°C, 47% Relative Humidity

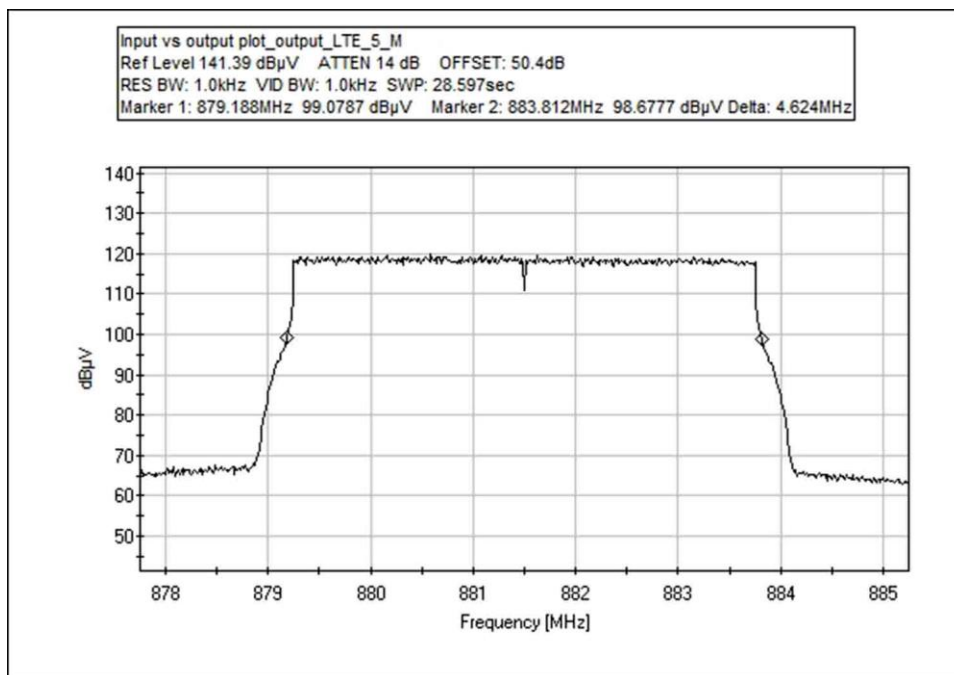
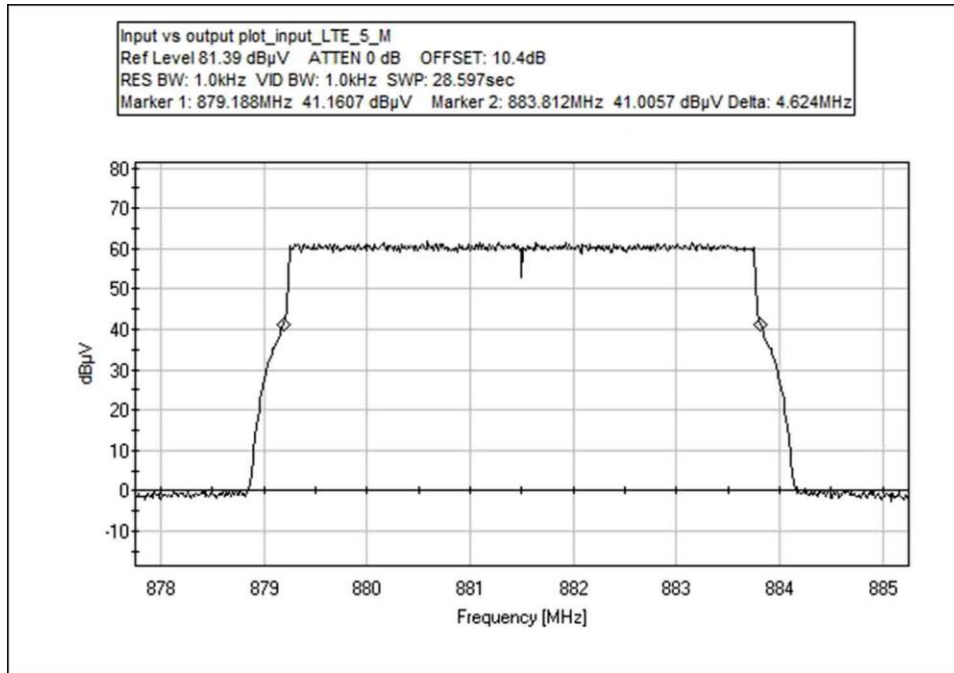
Test Data

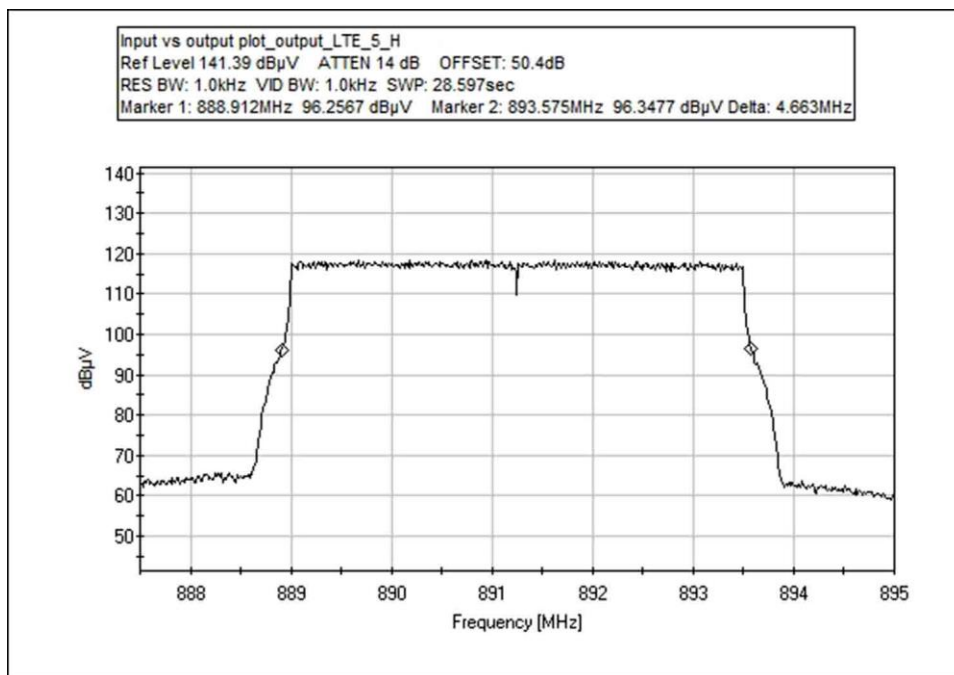
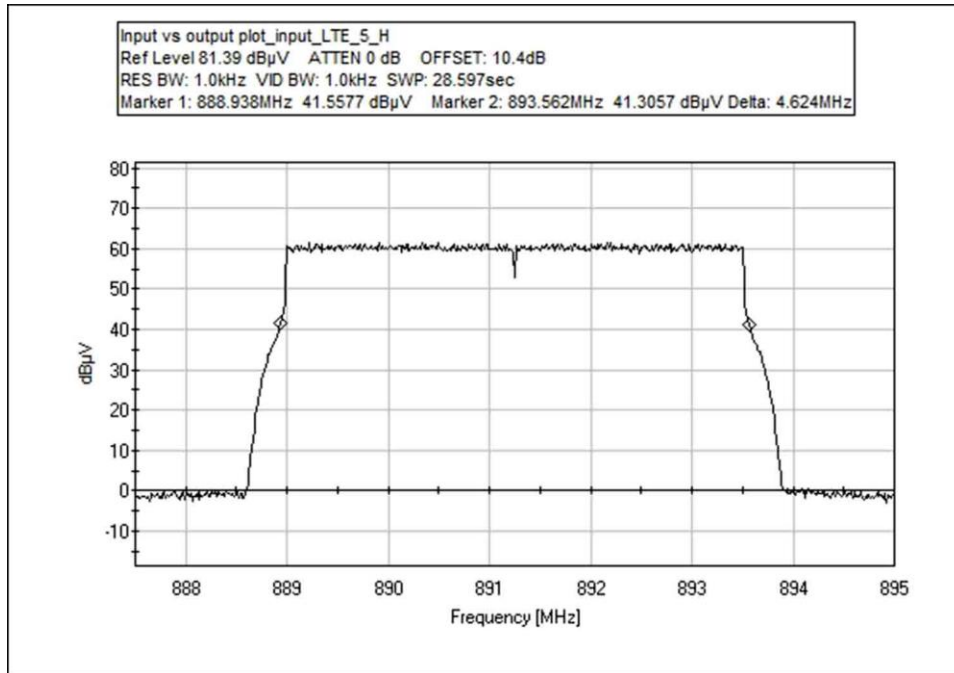


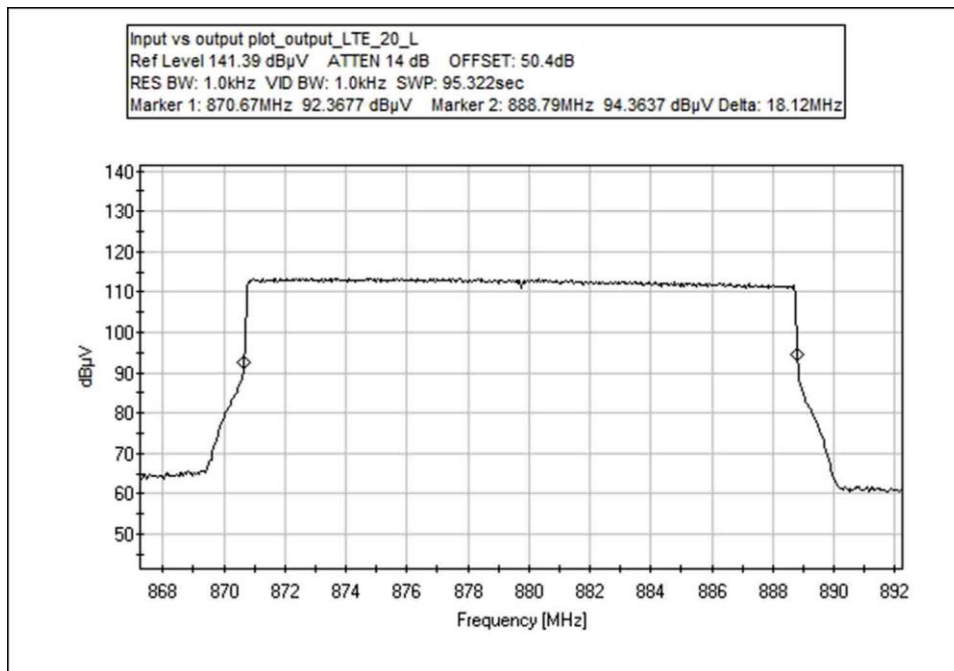
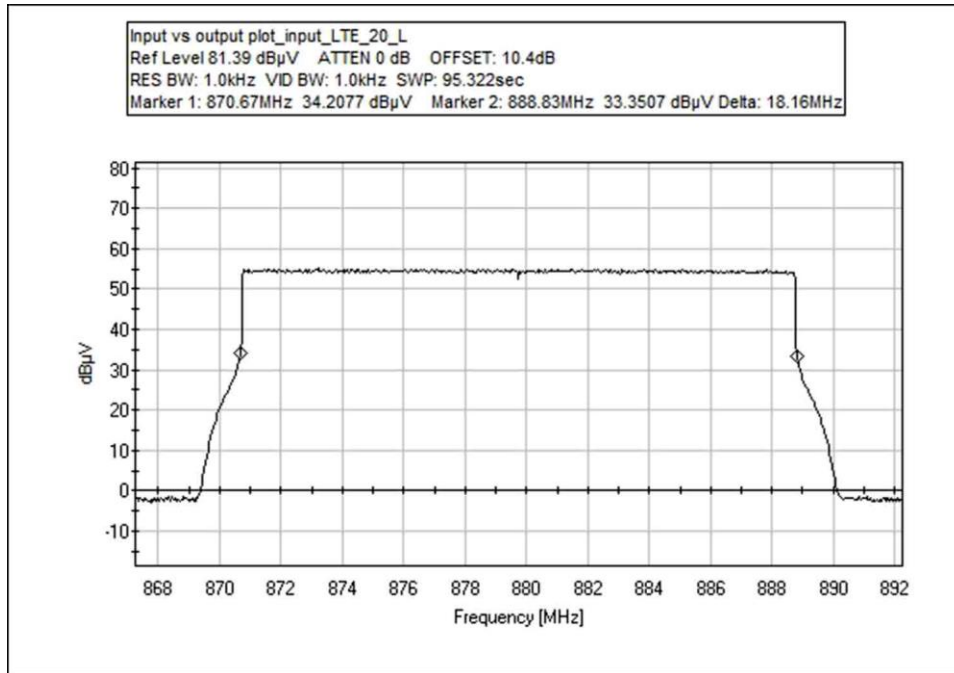


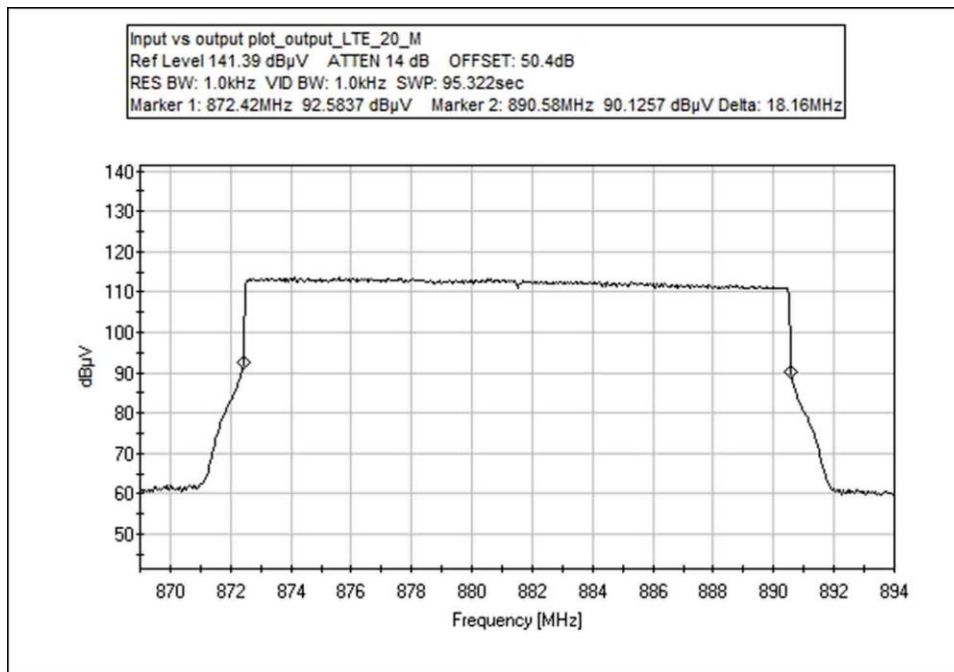
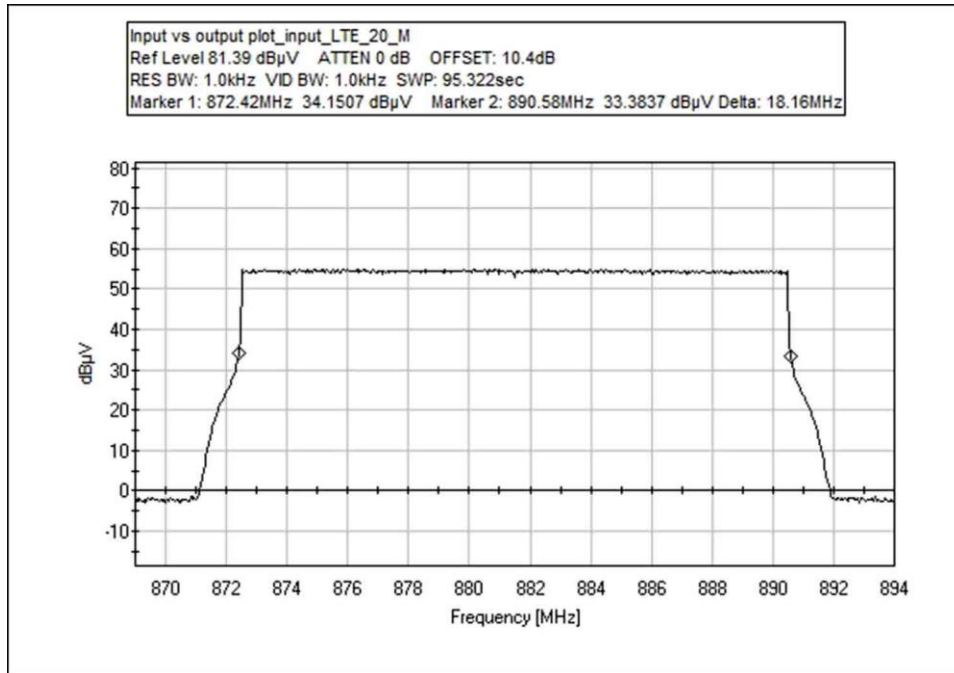


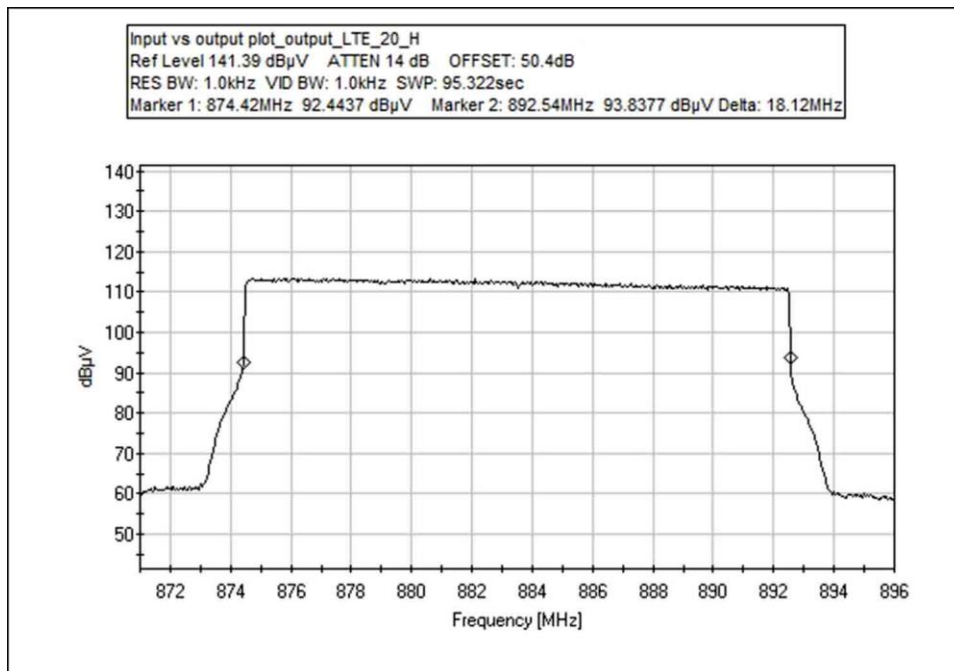
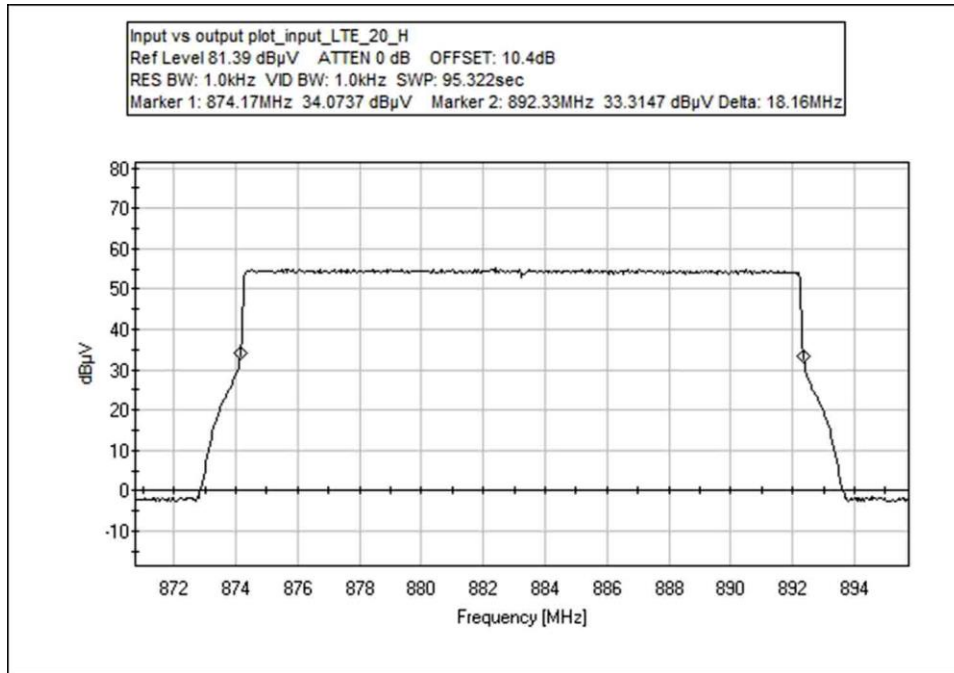












Test Setup Photos



2.1051 / 22.917(a) - Spurious Emissions at Antenna Terminal

Test Data

Test Location: CKC Laboratories, Inc. • 110 North Olinda Place • Brea, CA 92823 • 714-993-6112

Customer: **BTI Wireless**
 Specification: **FCC Part 22.917(a) Conducted Spurious Emission**
 Work Order #: **94690** Date: 7/24/2013
 Test Type: **Conducted Emissions** Time: 14:18:15
 Equipment: **800MHz 40W remote transmitting unit** Sequence#: 1
 Manufacturer: BTI Wireless Tested By: E. Wong
 Model: mBSC0800-040-RUSSF02 110V 60Hz
 S/N: 08001310001

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	2/6/2013	2/6/2015
T2	ANP06153	Cable	16301	10/27/2011	10/27/2013
T3	AN03169	High Pass Filter	HM1155-11SS	9/22/2011	9/22/2013

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
800MHz 40W remote transmitting unit*	BTI Wireless	mBSC0800-040-RUSSF02	08001310001

Support Devices:

Function	Manufacturer	Model #	S/N
ESG Vector Signal Generator	Agilent	4438C	MY45092055
ESG Vector Signal Generator	Agilent	4433B	US40052164

Test Conditions / Notes:

The EUT is placed on the test bench. Tx In is connected to an ESG; ANT is connected to a spectrum analyzer and attenuator. RX out port is terminated to 50 ohm load.
 The evaluation is performed at the antenna port.
 Freq: 869-894MHz
 LTE-TM1.1 1.4MHz, 5Mhz. 20MHz
 Power : 40 W
 LTE-TM1.1_1.4MHz 870MHz, 881.5MHz. 893MHz
 LTETM1.1_5.0MHz 890.75MHz 881.5MHz, 890.75MHz
 LTETM1.1_20MHz 879.75MHz, 881.5MHz, 883.25MHz
 Frequency range of measurement = 9 kHz- 9GHz.
 9kHz-150 kHz; RBW=200Hz, VBW=200 Hz; 150 kHz-30 MHz; RBW=9 kHz, VBW=9 kHz; 30 MHz-1000 MHz; RBW=120 kHz, VBW=120 kHz, 1000 MHz-9000 MHz; RBW=1 MHz, VBW=1 MHz.
 71°C, 47% Relative Humidity
 RMS detector.
 Trace average: 100 traces.

Ext Attn: 0 dB

Measurement Data:

Reading listed by margin.

Test Lead: Ant Port

#	Freq MHz	Rdng dB μ V	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dB μ V/m	Spec dB μ V/m	Margin dB	Polar Ant
1	2617.583M	73.6	+0.0	+0.6	+0.3		+0.0	74.5	94.0 LTE_5_L	-19.5	Ant P
2	2645.042M	72.1	+0.0	+0.6	+0.3		+0.0	73.0	94.0 LTE_5_M	-21.0	Ant P
3	1740.280M	71.5	+0.0	+0.5	+0.4		+0.0	72.4	94.0 LTE_1.4_L	-21.6	Ant P
4	2610.967M	71.4	+0.0	+0.6	+0.3		+0.0	72.3	94.0 LTE_5_H	-21.7	Ant P
5	1763.420M	71.0	+0.0	+0.5	+0.4		+0.0	71.9	94.0 LTE_1.4_M	-22.1	Ant P
6	2644.267M Ave	69.7	+0.0	+0.6	+0.3		+0.0	70.6	94.0 LTE_1.4_M	-23.4	Ant P
^	2644.267M	81.8	+0.0	+0.6	+0.3		+0.0	82.7	94.0 LTE_1.4_M	-11.3	Ant P
8	1786.100M	69.3	+0.0	+0.5	+0.4		+0.0	70.2	94.0 LTE_1.4_H	-23.8	Ant P
9	2638.200M	68.9	+0.0	+0.6	+0.3		+0.0	69.8	94.0 LTE_20_L	-24.2	Ant P
10	2609.750M Ave	68.6	+0.0	+0.6	+0.3		+0.0	69.5	94.0 LTE_1.4_L	-24.5	Ant P
^	2609.750M	81.1	+0.0	+0.6	+0.3		+0.0	82.0	94.0 LTE_1.4_L	-12.0	Ant P
12	1763.330M	68.0	+0.0	+0.5	+0.4		+0.0	68.9	94.0 LTE_5_M	-25.1	Ant P
13	2649.330M	67.8	+0.0	+0.6	+0.3		+0.0	68.7	94.0 LTE_20_H	-25.3	Ant P
14	2679.400M Ave	67.2	+0.0	+0.6	+0.3		+0.0	68.1	94.0 LTE_1.4_H	-25.9	Ant P
^	2679.400M	77.7	+0.0	+0.6	+0.3		+0.0	78.6	94.0 LTE_1.4_H	-15.4	Ant P
16	2645.000M	67.0	+0.0	+0.6	+0.3		+0.0	67.9	94.0 LTE_20_M	-26.1	Ant P
17	1743.000M	66.6	+0.0	+0.5	+0.4		+0.0	67.5	94.0 LTE_5_L	-26.5	Ant P
18	1740.700M	65.7	+0.0	+0.5	+0.4		+0.0	66.6	94.0 LTE_5_H	-27.4	Ant P
19	1767.000M	61.3	+0.0	+0.5	+0.4		+0.0	62.2	94.0 LTE_20_H	-31.8	Ant P
20	1767.500M	58.7	+0.0	+0.5	+0.4		+0.0	59.6	94.0 LTE_20_L	-34.4	Ant P
21	1765.100M	58.5	+0.0	+0.5	+0.4		+0.0	59.4	94.0 LTE_20_M	-34.6	Ant P

LIMIT LINE FOR SPURIOUS CONDUCTED EMISSION

$$\text{REQUIRED ATTENUATION} = 43 + 10 \text{ LOG P DB}$$

$$\text{Limit line (dBuV)} = V_{\text{dBuV}} - \text{Attenuation}$$

$$\begin{aligned} V_{\text{dBuV}} &= 20 \text{ Log } \frac{V}{1 \times 10^{-6}} \\ &= 20 (\text{Log } V - \text{Log } 1 \times 10^{-6}) \\ &= 20 \text{ Log } V - 20 \text{ Log } 1 \times 10^{-6} \\ &= 20 \text{ Log } V - 20 (-6) \\ &= 20 \text{ Log } V + 120 \end{aligned}$$

$$\begin{aligned} \text{Attenuation} &= 43 + 10 \text{ Log } P \\ &= 43 + 10 \text{ Log } \frac{V^2}{R} \\ &= 43 + 10 (\text{Log } V^2 - \text{Log } R) \\ &= 43 + 10 (2 \text{ Log } V - \text{Log } R) \\ &= 43 + 20 \text{ Log } V - 10 \text{ Log } R \end{aligned}$$

$$\begin{aligned} \text{Limit line} &= V_{\text{dBuV}} - \text{Attenuation} \\ &= 20 \text{ Log } V + 120 - (43 + 20 \text{ Log } V - 10 \text{ Log } R) \\ &= 20 \text{ Log } V + 120 - 43 - 20 \text{ Log } V + 10 \text{ Log } R \\ &= 20 \text{ Log } V + 120 - 43 - 20 \text{ Log } V + 10 \text{ Log } R \\ &= 120 - 43 + 10 \text{ Log } 50 \quad \text{Note : } R = 50 \Omega \\ &= 120 - 43 + 16.897 \\ &= 94 \text{ dBuV at any power level} \end{aligned}$$

Test Setup Photos



2.1053 / 22.917(a) - Field Strength of Spurious Radiation

Test Conditions / Setup

Test Location: CKC Laboratories, Inc. • 110 North Olinda Place • Brea, CA 92823 • 714-993-6112

Customer: **BTI Wireless**

Specification: **FCC Part 22.917(a) Radiated Spurious Emission**

Work Order #: **94690** Date: 7/29/2013

Test Type: **Maximized Emissions** Time: 10:28:48

Equipment: **800MHz 40W remote transmitting unit** Sequence#: 5

Manufacturer: BTI Wireless Tested By: Don Nguyen

Model: mBSC0800-040-RUC11

S/N: 08001310001

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN00309	Preamp	8447D	3/29/2012	3/29/2014
	AN01995	Biconilog Antenna	CBL6111C	5/16/2012	5/16/2014
	ANP05050	Cable	RG223/U	1/21/2013	1/21/2015
	ANP05198	Cable-Amplitude 15 to 45degC (dB)	8268	12/11/2012	12/11/2014
T1	AN02869	Spectrum Analyzer	E4440A	2/6/2013	2/6/2015
	AN00314	Loop Antenna	6502	6/29/2012	6/29/2014
T2	AN00787	Preamp	83017A	5/31/2013	5/31/2015
T3	AN00849	Horn Antenna	3115	4/13/2012	4/13/2014
T4	ANP05421	Cable	Sucoflex 104A	2/8/2012	2/8/2014
T5	ANP05988	Cable	LDF1-50	3/12/2012	3/12/2014
T6	ANP06153	Cable	16301	10/27/2011	10/27/2013

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
800MHz 40W remote transmitting unit*	BTI Wireless	mBSC0800-040-RUC11	08001310001

Support Devices:

Function	Manufacturer	Model #	S/N
Power Meter	HP	EPM-441A	GB37170458
Power Sensor	Agilent	E4412A	MY41502826
ESG Vector Signal Generator	Agilent	4433B	US40031692

Test Conditions / Notes:

The EUT is installed on an open rack to simulating final installation, and placed on the wooden table. Tx In is connected to a remotely located ESG, ANT is connected to a power meter for verification of output power level. RX out port is terminated to 50 ohm load.

Freq: 869-894MHz
 Signal protocol: LTE-TM1.1 1.4MHz, 5MHz. 20MHz
 Power : 40 W (Max rated power)

This test is perform with a modulated narrow band signal
 GSM 869.5MHz 881.5MHz 893.5MHz

Frequency range of measurement = 9kHz- 9GHz.
 9kHz -150 kHz; RBW=200 Hz, VBW=200 Hz;150 kHz-30 MHz; RBW=9 kHz, VBW=9 kHz;30 MHz-1000 MHz;
 RBW=120 kHz, VBW=120 kHz,1000 MHz-9000 MHz; RBW=1 MHz, VBW=1 MHz.

21°C, 47% RH

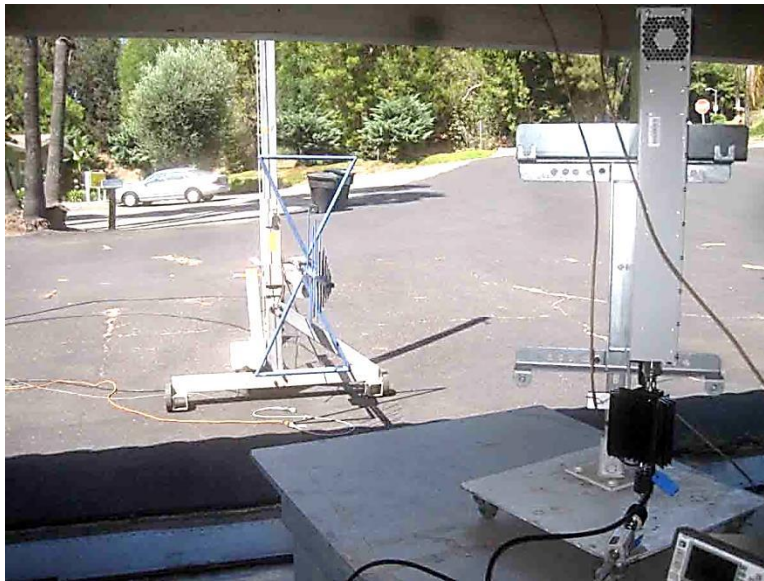
RMS detector.

Test Data

Operating Frequency: 869-894MHz
 Channels: GSM
 Highest Measured Output
 Power: 46.00 (dBm)= 40 (Watts)
 Distance: 3 meters
 Limit: $43+10\text{Log}(P)=$ 59.02 dBc

Freq. (MHz)	Reference Level (dBm)	Antenna Polarity (H/V)	dBc
1,739.00	-55.12059991	Horiz	101.12
2,608.50	-56.32059991	Horiz	102.32
1,763.00	-55.02059991	Horiz	101.02
2,644.50	-56.12059991	Horiz	102.12
1,787.00	-56.82059991	Horiz	102.82
2,680.50	-57.22059991	Horiz	103.22
1,787.00	-55.42059991	Vert	101.42
2,680.50	-55.92059991	Vert	101.92
1,763.00	-57.22059991	Vert	103.22
2,644.50	-57.92059991	Vert	103.92
1,739.00	-55.82059991	Vert	101.82
2,608.50	-56.22059991	Vert	102.22
			PASS

Test Setup Photos





Bandedge

Test Conditions / Setup

Test Location: CKC Laboratories, Inc. • 110 North Olinda Place • Brea, CA 92823 • 714-993-6112

Customer: **BTI Wireless**
 Specification: **Bandedge plot**
 Work Order #: **94690** Date: 7/24/2013
 Test Type: **Conducted Emissions** Time: 14:18:15
 Equipment: **800MHz 40W remote transmitting unit** Sequence#: 1
 Manufacturer: BTI Wireless Tested By: E. Wong
 Model: mBSC0800-040-RUC11 110V 60Hz
 S/N: 08001310001

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	2/6/2013	2/6/2015
T2	ANP06153	Cable	16301	10/27/2011	10/27/2013

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
800MHz 40W remote transmitting unit*	BTI Wireless	mBSC0800-040-RUC11	08001310001

Support Devices:

Function	Manufacturer	Model #	S/N
ESG Vector Signal Generator	Agilent	4433B	US40052164

Test Conditions / Notes:

The EUT is placed on the test bench. Tx In is connected to an ESG, ANT is connected to a spectrum analyzer and attenuator. RX out port is terminated to 50 ohm load.

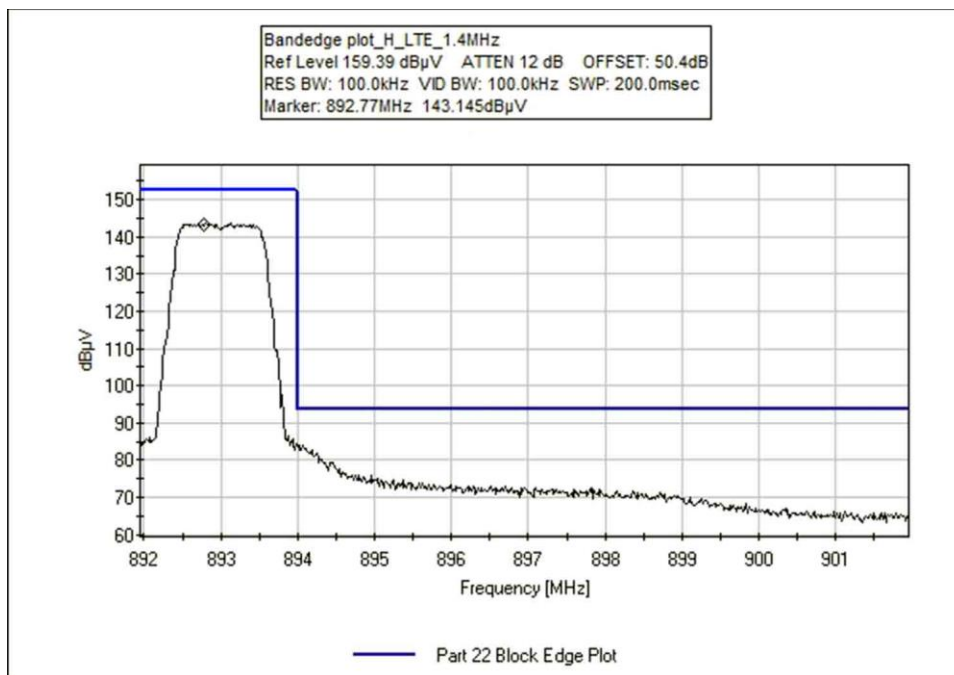
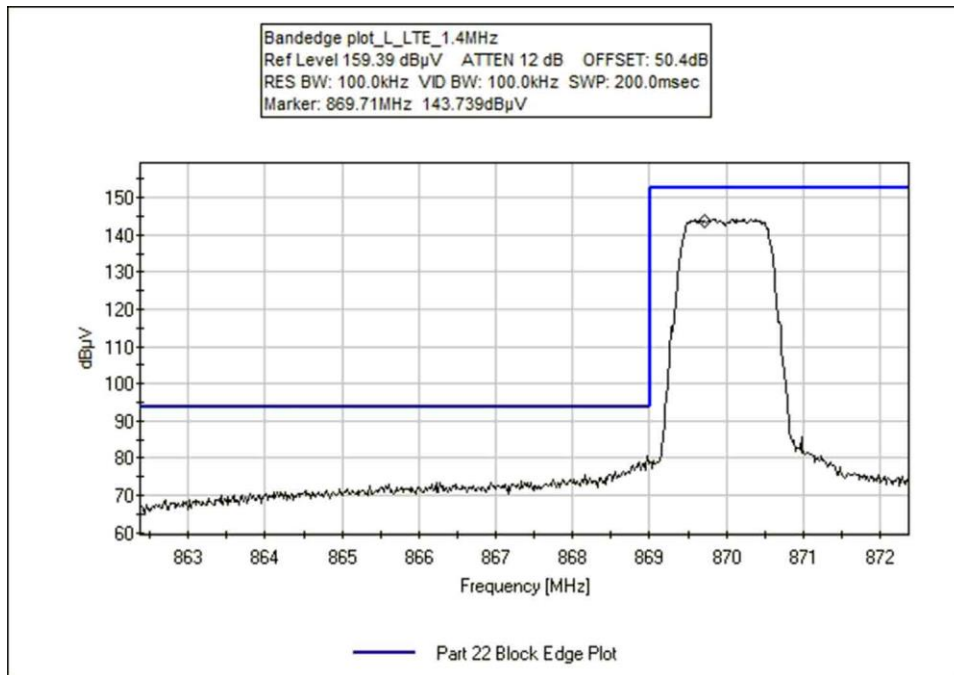
The evaluation is performed at the antenna port.

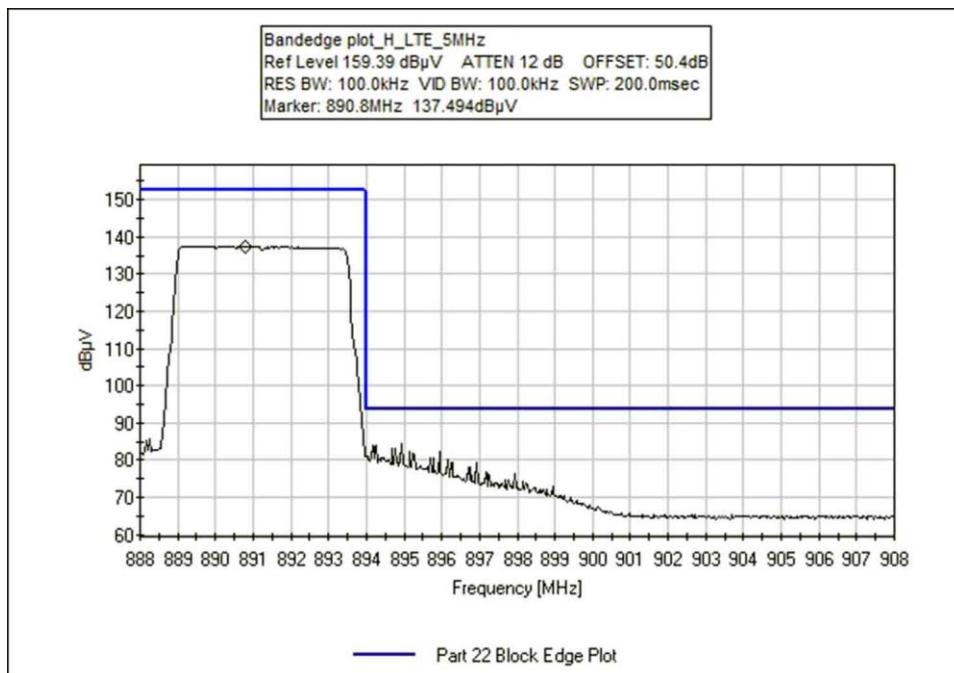
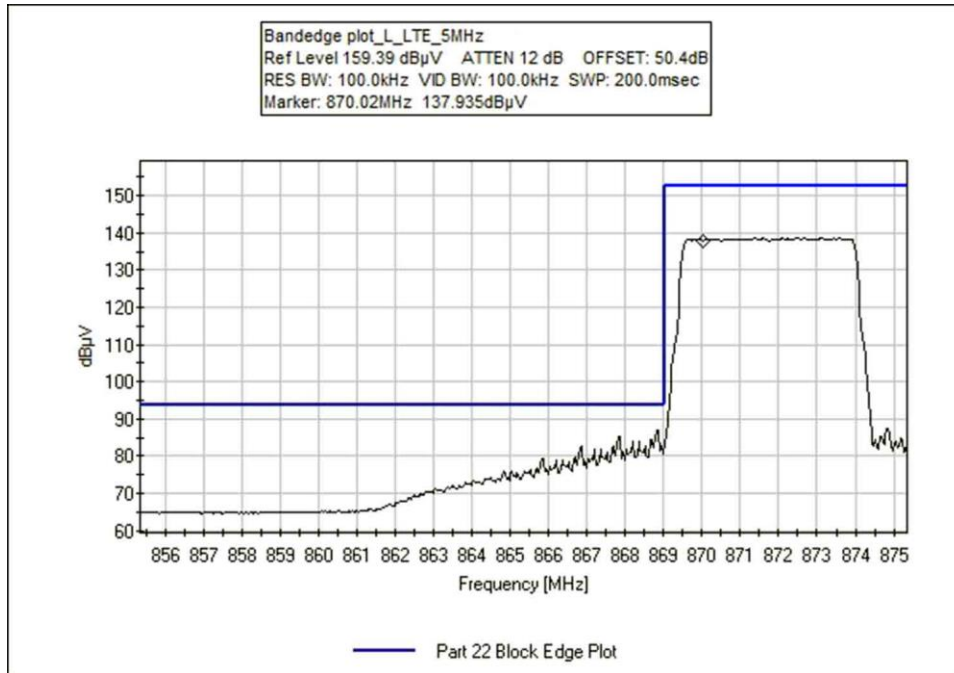
Freq: 869-894MHz
 Signal protocol: LTE-TM1.1 1.4MHz, 5MHz. 20MHz

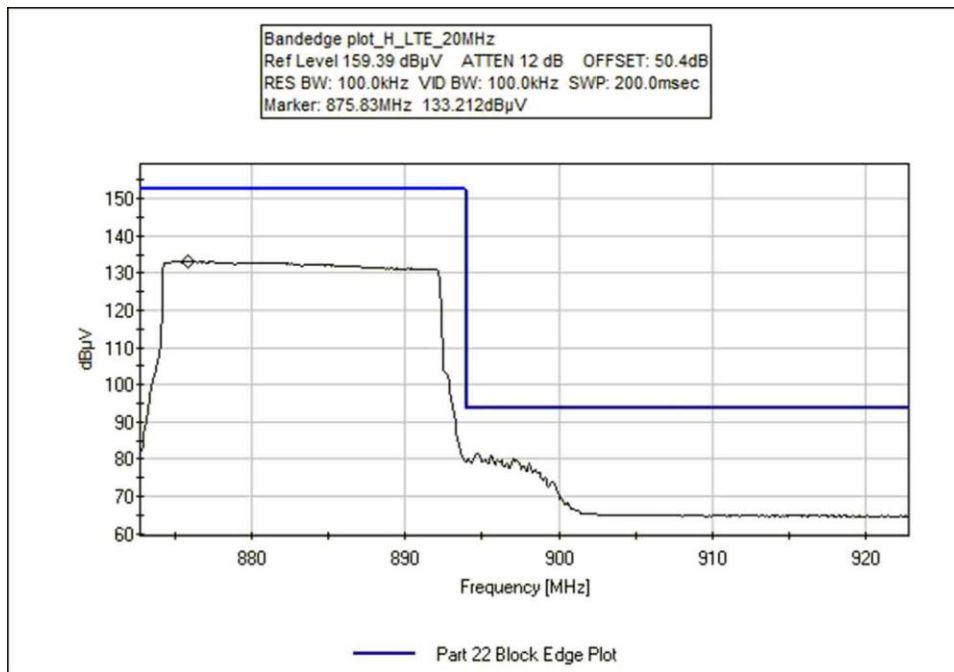
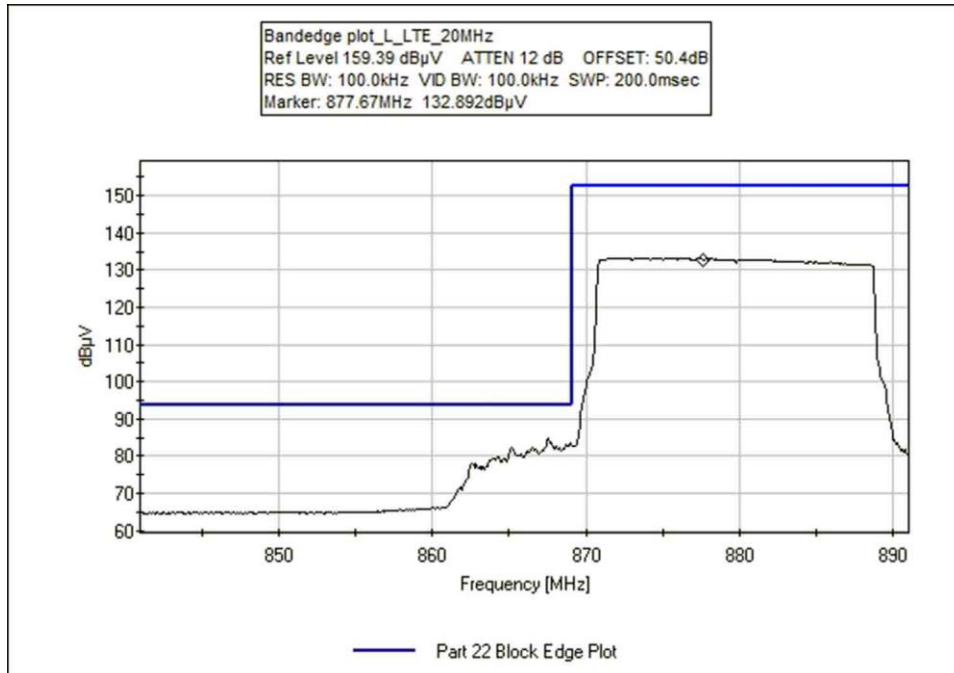
Power: 40 W

21°C, 47% Relative Humidity

Test Data







Test Setup Photos



Intermodulation

Test Conditions / Setup

Test Location: CKC Laboratories, Inc. • 110 North Olinda Place • Brea, CA 92823 • 714-993-6112

Customer: **BTI Wireless**
 Specification: **Intermodulation**
 Work Order #: **94690** Date: 7/24/2013
 Test Type: **Conducted Emissions** Time: 14:18:15
 Equipment: **800MHz 40W remote transmitting unit** Sequence#: 1
 Manufacturer: BTI Wireless Tested By: E. Wong
 Model: mBSC0800-040-RUC11 110V 60Hz
 S/N: 08001310001

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	2/6/2013	2/6/2015
T2	ANP06153	Cable	16301	10/27/2011	10/27/2013

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
800MHz 40W remote transmitting unit*	BTI Wireless	mBSC0800-040-RUC11	08001310001

Support Devices:

Function	Manufacturer	Model #	S/N
ESG Vector Signal Generator	Agilent	4433B	US40052164
ESG Vector Signal Generator	Agilent	4433B	US40031692

Test Conditions / Notes:

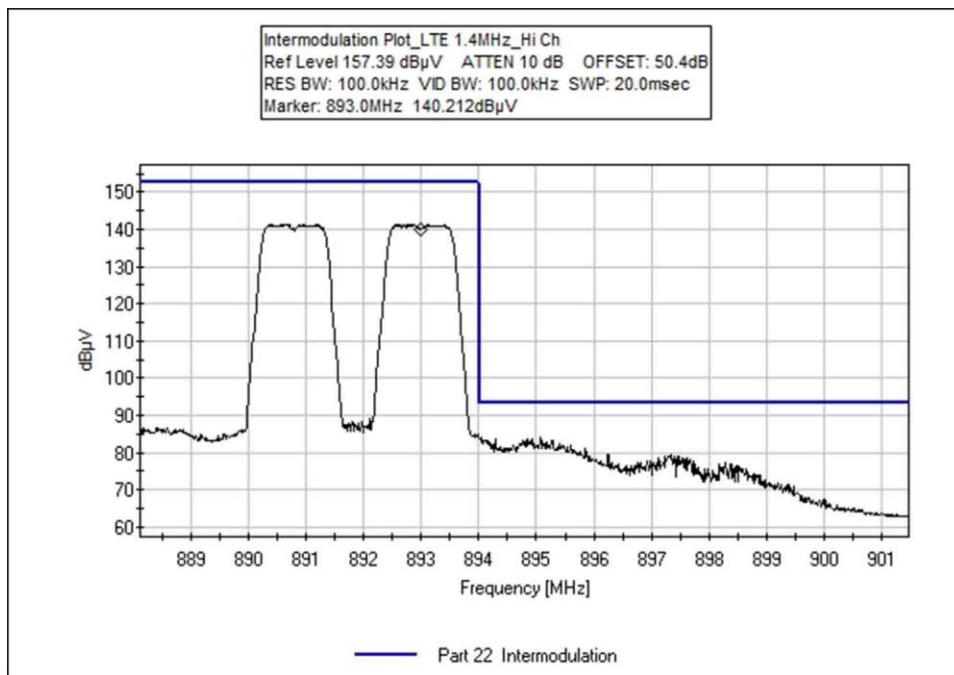
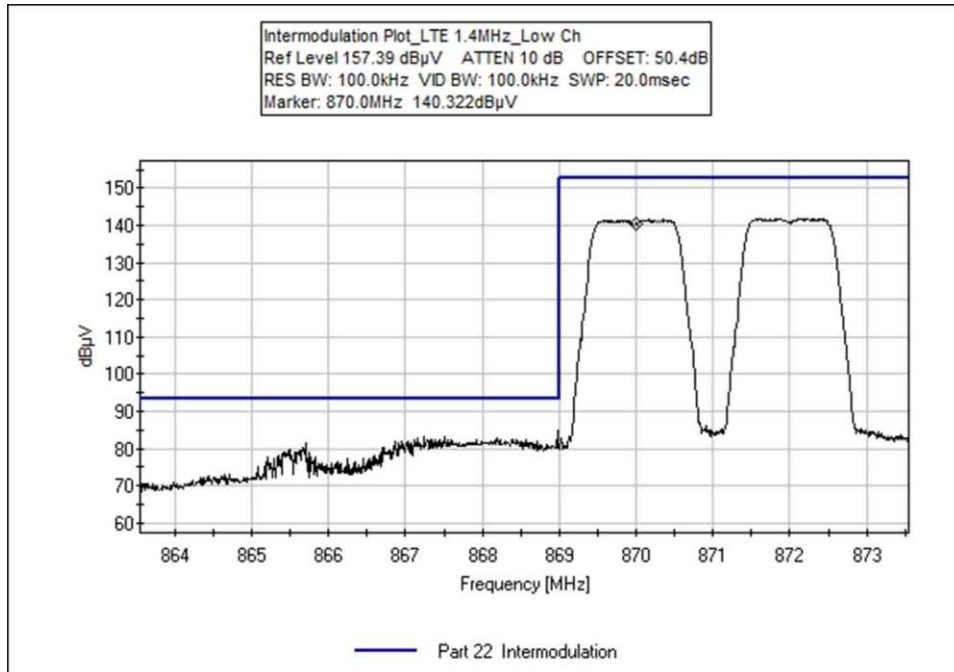
The EUT is placed on the test bench. Tx In is connected to two ESGs via a power combiner, ANT is connected to a spectrum analyzer and attenuator. RX out port is terminated to 50 ohm load.

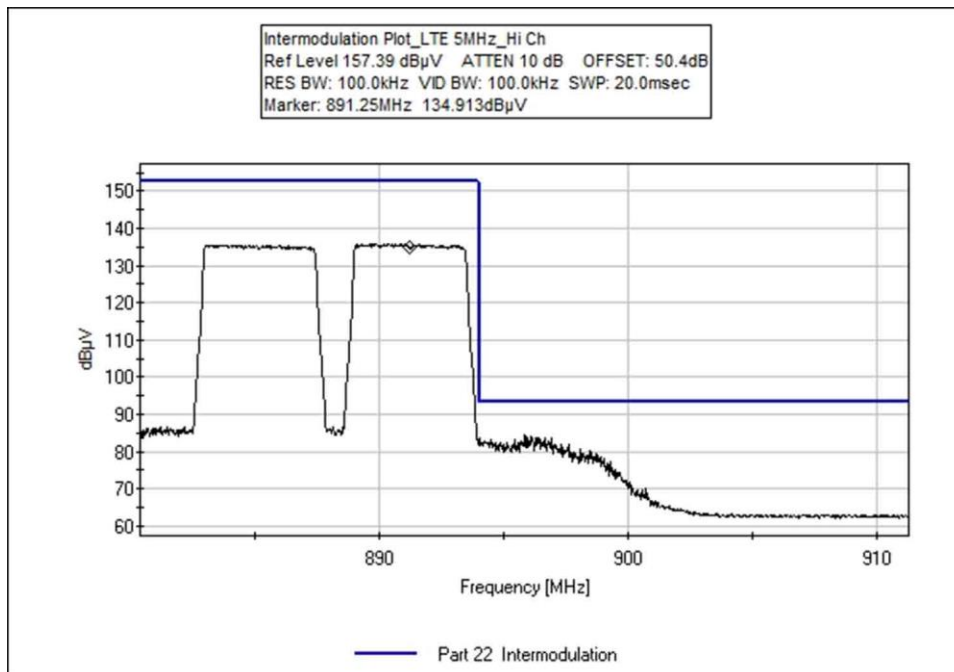
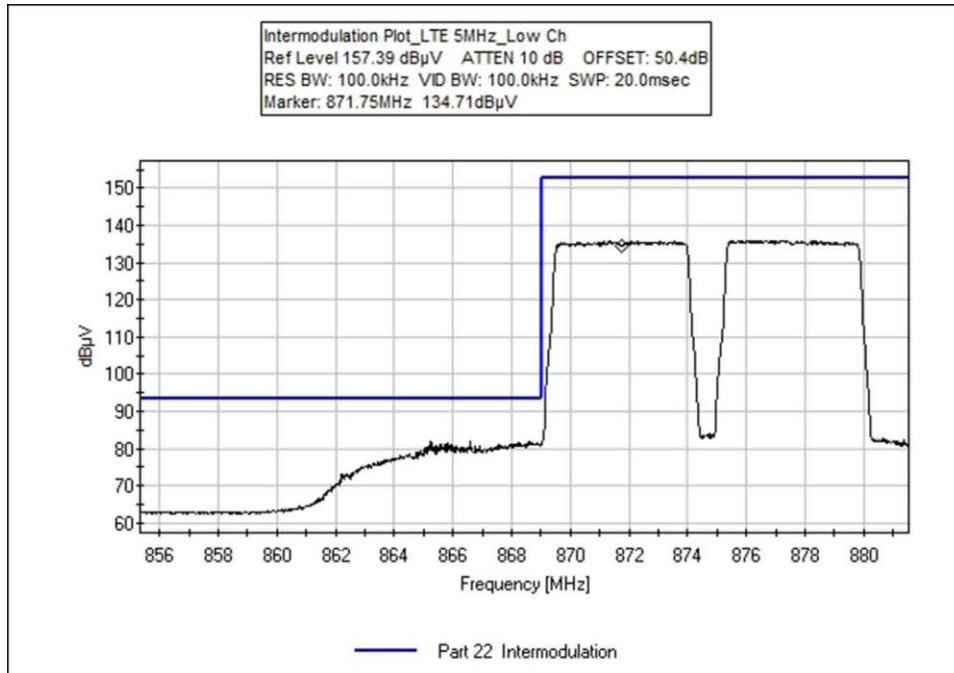
The evaluation is performed at the antenna port.

Freq: 869-894MHz
 Signal protocol: LTE-TM1.1 1.4MHz, 5MHz.
 Input signal levels were set to produce maximum rated RF output power.
 Power: 40 W

21°C, 47% Relative Humidity

Test Data





Test Setup Photos



Out of Band Rejection

Test Conditions / Setup

Test Location: Brea

Customer: **BTI Wireless**

Specification: **Out of band rejection plot**

Work Order #: **94690** Date: 7/25/2013

Test Type: **Conducted Emissions** Time: 16:47:52

Equipment: **800MHz 40W remote transmitting unit** Sequence#: 4

Manufacturer: BTI Wireless Tested By: E. Wong

Model: mBSC0800-040-RUC11 110V 60Hz

S/N: 08001310001

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	C00054	Network Analyzer	8753E	9/12/08	9/12/10

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
800MHz 40W remote transmitting unit*	BTI Wireless	mBSC0800-040-RUC11	08001310001

Test Conditions / Notes:

The EUT is placed on the test bench. Tx In is connected to Port 1 of the Network Analyzer, ANT is connected Port 2 of the Network Analyzer via an attenuator. RX out port is terminated to 50 ohm load.

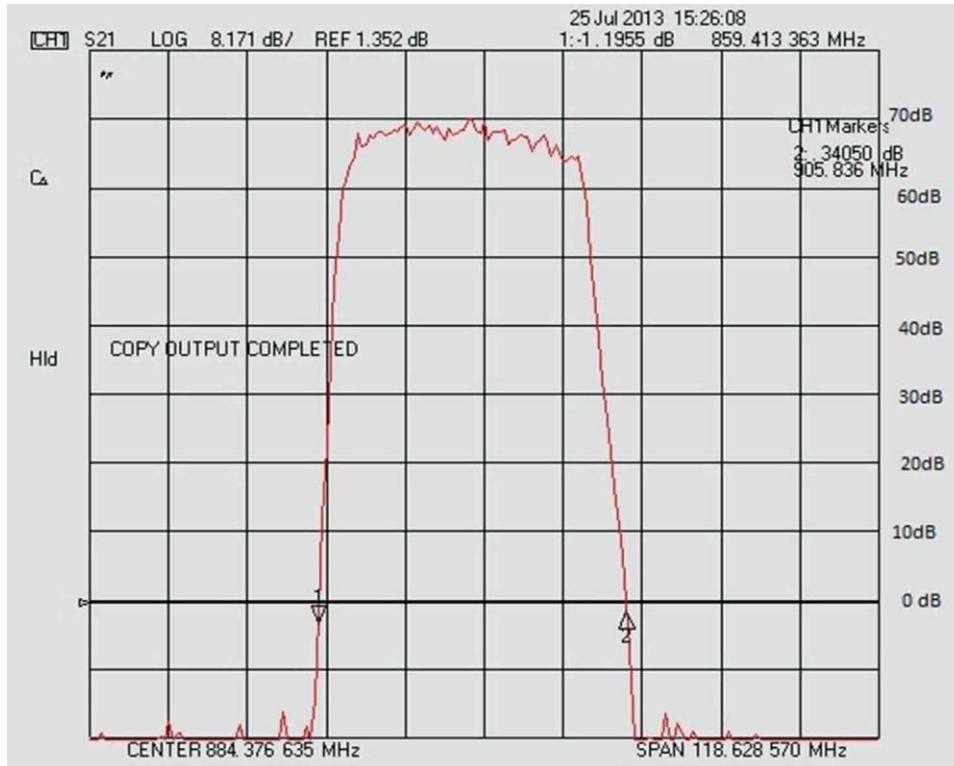
The evaluation is performed at the antenna port.

Freq: 869-894MHz
Power: 40 W

Frequency range of measurement = 824-944MHz

21°C, 47% Relative Humidity

Test Data



Test Setup Photos



SUPPLEMENTAL INFORMATION

Measurement Uncertainty

Uncertainty Value	Parameter
4.73 dB	Radiated Emissions
3.34 dB	Mains Conducted Emissions
3.30 dB	Disturbance Power

The reported measurement uncertainties are calculated based on the worst case of all laboratory environments from CKC Laboratories, Inc. test sites. Only those parameters which require estimation of measurement uncertainty are reported. The reported worst case measurement uncertainty is less than the maximum values derived in CISPR 16-4-2. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k=2. Compliance is deemed to occur provided measurements are below the specified limits.

Emissions Test Details

TESTING PARAMETERS

Unless otherwise indicated, the following configuration parameters are used for equipment setup: The cables were routed consistent with the typical application by varying the configuration of the test sample. Interface cables were connected to the available ports of the test unit. The effect of varying the position of the cables was investigated to find the configuration that produced maximum emissions. Cables were of the type and length specified in the individual requirements. The length of cable that produced maximum emissions was selected.

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the setup photographs. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables.

The emissions data was taken with a spectrum analyzer or receiver. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in the table below. The corrected data was then compared to the applicable emission limits. Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in dBμV/m, the spectrum analyzer reading in dBμV was corrected by using the following formula. This reading was then compared to the applicable specification limit.

SAMPLE CALCULATIONS		
	Meter reading	(dB μ V)
+	Antenna Factor	(dB)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dB μ V/m)

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed were used to collect the emissions data. A spectrum analyzer or receiver was used for all measurements. Unless otherwise specified, the following table shows the measuring equipment bandwidth settings that were used in designated frequency bands. For testing emissions, an appropriate reference level and a vertical scale size of 10 dB per division were used.

MEASURING EQUIPMENT BANDWIDTH SETTINGS PER FREQUENCY RANGE			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
CONDUCTED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	9 kHz	150 kHz	200 Hz
RADIATED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz
RADIATED EMISSIONS	1000 MHz	>1 GHz	1 MHz

SPECTRUM ANALYZER/RECEIVER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in the emissions tables indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "positive peak" detector mode. Whenever a "quasi-peak" or "average" reading was recorded, the measurement was annotated with a "QP" or an "Ave" on the appropriate rows of the data sheets. In cases where quasi-peak or average limits were employed and data exists for multiple measurement types for the same frequency then the peak measurement was retained in the report for reference, however the numbering for the affected row was removed and an arrow or carrot ("^") was placed in the far left-hand column indicating that the row above takes precedence for comparison to the limit. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data.

Peak

In this mode, the spectrum analyzer or receiver recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature called "peak hold," the measurement device had the ability to measure intermittent or low duty cycle transient emission peak levels. In this mode the measuring device made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

Quasi-Peak

Quasi-peak measurements were taken using the quasi-peak detector when the true peak values exceeded or were within 2 dB of a quasi-peak specification limit. Additional QP measurements may have been taken at the discretion of the operator.

Average

Average measurements were taken using the average detector when the true peak values exceeded or were within 2 dB of an average specification limit. Additional average measurements may have been taken at the discretion of the operator. If the specification or test procedure requires trace averaging, then the averaging was performed using 100 samples or as required by the specification. All other average measurements are performed using video bandwidth averaging. To make these measurements, the test engineer reduces the video bandwidth on the measuring device until the modulation of the signal is filtered out. At this point the measuring device is set into the linear mode and the scan time is reduced.